RAILROAD GAZETTE

FRIDAY, AUGUST 22, 1902.

CONTENTS

ILLUSTRATED:
The Re-building of the Baltimore & Ohio Railroad. 651
A Gasoline Motor Inspection Car. 655
Shop Notes. 656
The Boston Pneumatic Tube Service. 657
Pneumatic Staybolt Appliances. 660
Laas's Anti-Creeper. 660
Lap Point Switch—Boston Terminal Company. 660

CONTRIBUTIONS:
"A Plea in Equity". 651

EDITORIAL:
Forty-one Rear Collisions. 658
New Southern Pacific Bonds. 659
Editorial Notes. 658, 659
New Publications. 659
Trade Catalogues. 659

MISCELLANEOUS:
William Hasell Wilson. 651
Subjects and Reporters—International Railway Congress. 654
Acetylene Car Lighting. 655
Is it Unprofessional for an Engineer to Be a Patentee? 655
Foundation Brake Gear. 659
The South African Railroads. 660

GENERAL NEWS:
Technical. 660
The Scrap Heap. 661
Locomotive Building. 662
Car Building. 662
Bridge Building. 662
Meetings and Announcements. 663
Personal. 663
Elections and Appointments. 663
Railroad Construction. 664
General Railroad News. 664

Contributions

"A Plea in Equity."

TO THE EDITOR OF THE RAILROAD GAZETTE:

According to an item in a recent issue of the Pittsburgh *Post*, the officials of the Lake Shore road have decided to raise the educational standard of their firemen. While no general order to that effect has yet been issued, it is understood that hereafter the company will give preference to men who have received at least a good common school education.

This is well, but from the beginning to the end of his daily run the fireman is required to wield the scoop with unflagging energy, for the modern locomotive is such a coal-glutton, owing to its prodigious size, that the fireman's strength and endurance is taxed to the utmost limit in order to keep up sufficient steam to get over the road. He has no time to study his great object lesson—his engine; no time to do anything but shovel coal; not even the time to properly look out for signals and danger. The result is that he comes in from his run tired out, often upon the point of physical collapse, and has neither the energy nor the inclination to devote a part of his leisure to study, as he should do. While locomotives have been growing, the fireman has remained the same size.

Book-lore is not all that is required to fit the fireman for an engineer's position; it is but the foundation for the structure that is to be reared later on. He must have time and opportunity to develop these elementary features of his education by the application of practical ideas which are drawn from actual working experience, and this part of his training can only be acquired by lightening his present burden and increasing his opportunities for study.

The writer can find but one definite solution to this rather vexatious problem, and that is to adopt the use of a mechanical stoker.

Education for the fireman by all means—then the mechanical locomotive stoker to give him the opportunities he seeks for the acquisition of his practical engine-lore.

EQUITY.

[There is an old story of a British Superintendent who saw for the first time an engineman sitting on a cushioned seat in a comfortable cab. He snorted with indignation: "I dessay you'll bring your bloomin' bed to-morrow." What would he say if he were to see the fireman, seated in an arm-chair, working out "originals" in geometry, while the mechanical stoker stoked? But we all know that if a man is to do his best work and produce his maximum results he must not be overworked and must be reasonably comfortable. This is not the weakest of all the arguments for mechanical stokers.—EDITOR.]

William Hasell Wilson.

Mr. William Hasell Wilson died at his home in Philadelphia last Sunday, the 17th, in his 91st year. Mr. Wilson must have been almost the last survivor of the little group of men whose working lives had covered the whole period of the development of the steam railroad from its very beginning, and whose lives had been spent entirely in that work. Mr. Wilson was identified with the railroads of the country from the first and was in railroad service at the time of his death. He was the son of Major John Wilson and was born at Charleston, South Carolina, Nov. 5, 1811. His father was the son of Lieutenant John Wilson, of the 71st Highlanders, who was actively engaged during the Revolutionary War, for most of the time on engineer duty as assistant to Major Moncrief, of the Royal Engineers. The mother of William Hasell Wilson, was the daughter of William Haseli Gibbes, who was a Captain of State Artillery during the Revolutionary War, and a great-grandson of Robert Gibbes, Governor of South Carolina in 1710 to 1712. William Hasell Wilson pursued a classical course of education at private schools, and at the Charleston College, and took private lessons in mathematics and drawing.

In June, 1827, he accompanied as a volunteer a surveying party under his father, locating a railroad from Philadelphia to the Susquehanna River, but served for most of the time during the summer months as a chainman, having for an associate, John Edgar Thomson, subsequently Chief Engineer and President of the Pennsylvania Railroad Company. In March, 1828, a large corps was organized for the location of the Philadelphia & Columbia Railroad, in which Wilson served as rodman, continuing in service as Assistant Engineer on construction during the years 1829 and 1830, and as Principal Assistant Engineer in charge of the work on the eastern 40 miles of the road, from March, 1831, until its completion, and the disbandment of the engineer corps in October, 1834.

In the spring of 1835 he took charge as Principal Assistant under Messrs. Moncure and Wirt Robinson, of the final location and construction of the second division of the Philadelphia & Reading Railroad, extending from a point a few miles east of Pottstown to Bridgeport, opposite Norristown. In June, 1838, the work under his care being about completed, he accepted from the Canal Commissioners the appointment of Chief Engineer of the "Gettysburg Extension" of the State Railroad, the grading of which was then in progress. The work on this line, as well as on most other portions of the State improvements, was suspended in the early part of the year 1839.

The prospect of satisfactory professional employment being unpromising Mr. Wilson at the beginning of the year 1841 turned his attention to farming, in which he continued until the close of the year 1858, although for the last few years of the period he was more or less engaged in professional matters.

During the summers of 1852 and 1853 he made extensive surveys for the Pennsylvania Railroad Company, and located a line of railroad from Philadelphia, via Phœnixville and the French Creek and Conestoga Valleys, to a connection with the Harrisburg & Lancaster Railroad about eight miles west of Lancaster. The latter road was operated under lease by the Pennsylvania Railroad Company, and the construction of the proposed new line was contemplated for the purpose of affording the company an independent route, free from the many annoyances attendant upon the use of the State Railroad as a part of the through line between Philadelphia and Pittsburgh. The subsequent sale of the State works, and the acquisition of the "Main Line" by the Pennsylvania Railroad Company, put a stop to the proposed construction of the alternative line.

Early in the year 1854 Mr. Wilson took the position of Chief Engineer of the Philadelphia & West Chester Railroad, then being built. After the road was completed as far as Media, and the grading and bridging thence to West Chester well advanced, work was suspended for want of funds and he left the service at the end of the year 1855.

During the succeeding 18 months he made surveys for a railroad between Norristown and Allentown, and for an extension of the Pennsylvania Railroad to the Delaware River, and on the purchase of the main line of State improvements by the Pennsylvania he was appointed Resident Engineer of the line between Philadelphia and Columbia, and entered on his duties Aug. 1, 1857. In January, 1859, he was placed in charge of the entire line to Pittsburgh with its branches. This rendered necessary a change of residence to Altoona, which was the headquarters of the Operating Department of the Company. In 1862 his title was changed to Chief Engineer. He was assisted by an "Engineer of Bridges and Buildings," and a "Resident Engineer" on each of the three divisions of the main line, and on the Tyrone Division.

The constantly increasing duties of the maintenance-of-way, together with the large amount of construction work devolving upon the Engineer's Department, had by the close of the year 1867 accumulated to such an extent as to render a division of labor necessary. A Department of Construction was accordingly organized to take charge of new work, which went into operation on Jan. 1, 1868, under W. Hasell Wilson as Chief Engineer, with headquarters at Philadelphia. The maintenance-of-way remained under the General Superintendent of Transportation as a separate department.

During the succeeding six years a very large amount of new work was built, embracing passenger, freight, water and coaling stations, additional tracks, car shops, piers and coal-chutes at the Delaware River, and the straightening of several miles of road on the Philadelphia Division. During the same period, the Construction Department had charge of a considerable amount of new work on the Philadelphia & Erie, and the Lewisburg Railroads.

In November, 1873, Mr. Wilson was elected President of the Philadelphia & Erie Railroad Company, but was continued in the service of the Pennsylvania Railroad Company with the title of Consulting Engineer, for the purpose of closing up the work previously under his charge. In July, 1874, he resigned the Presidency of the Philadelphia & Erie Railroad Company and was placed at the head of a new department of the Pennsylvania Railroad Company, entitled the "Real Estate Department," which he organized. In March, 1884, Mr. Wilson left the Real Estate Department, having been elected President of the Philadelphia & Erie Railroad Company, and of several other companies whose lines were controlled by the Pennsylvania Railroad Company. These positions were resigned by him in the early part of the year 1894, with the exception of the Presidency of the Belvidere Delaware Railroad Company, which he retained until his death.

In 1895 he published (Allen, Lane & Scott, Philadelphia) a valuable pamphlet called "A Brief Review of Railroad History," etc.; and later he wrote some "Reminiscences of a Railroad Engineer."

Mr. Wilson was an honorary member of the American Society of Civil Engineers, and also an honorary member of the Engineers' Club, of Philadelphia.

The Re-building of the Baltimore & Ohio Railroad.

The General Scheme.—Amongst all of the important and interesting railroad work that is now going on there is little that is more interesting and more important than the revision of the lines of the Baltimore & Ohio. The Pennsylvania Railroad and the Union Pacific are spending more money, but on the Baltimore & Ohio the fundamental character of the railroad is being changed. Within a few years it will be an entirely different kind of railroad from what anyone ever expected it would be. It is the ambition and the expectation of the present management to make the Baltimore & Ohio Railroad the best freight carrying road from the middle west to the sea, and obviously the low grades and easy curves of a first-class freight road adapt it to carrying passengers also.

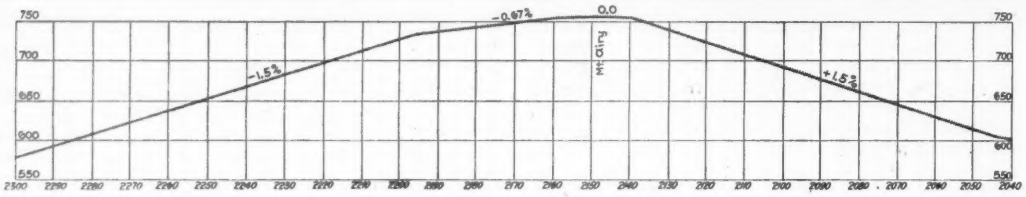
This is an astonishing proposition when it is first stated, but it is less astonishing when we reflect on the relation of the traffic of the Baltimore & Ohio to the general profile of the line. It so happens that the traffic summit and the topographical summit of the line nearly coincide. The great tonnage of the Baltimore & Ohio is coal and coke, which originates close to the summit of the line and drops down either way to the lakes and the sea. This traffic summit lies in the mountain country east and south of Pittsburgh. Of course, it is not a definite point, but a considerable area, and yet it is probably not misleading to say that the great reservoir of traffic is somewhere about 30 or 40 miles west of the summit of the Alleghanies, and this summit is also the peak of the topographical profile.

The plan in general is to reduce the grades west of Connellsville and Fairmont to 0.3 of 1 per cent. (15.8 ft. per mile) westbound, and 0.37 (19.5 ft. per mile) eastbound. It should be kept in mind in all that is said here on this subject that under the scheme of revision all grades are compensated for curvature, while in the line as it existed before the revision began there was no compensation. This adjustment of grades, eastbound and westbound, west of Connellsville and Fairmont balances pretty closely, as the heaviest movement is westbound taking coal and coke to the manufacturing centers of the middle west and to the lake ports. It is expected to work on this western low grade line standard trains of 2,700 to 3,000 tons of gross load. On this part of the system there are now two short helper grades westbound, one of which will be taken out in the next two or three years. The eliminating of the other depends on building an alternate line, of which perhaps the less said now the better.

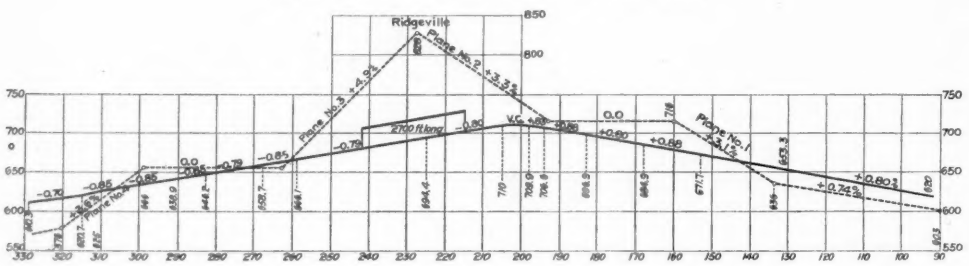
East of Connellsville the controlling grades will be 0.75 of 1 per cent. (39.6 ft. per mile) eastbound to the summit of the mountains, and 0.3 thence to Baltimore. There will be one short helper grade eastbound at Mt. Airy. Except for 20 miles approaching the summit of the Alleghanies, where a helping grade of 1.5 per cent. is used, the ruling grade westbound is 0.8 per cent., which is approximately the proper balance for the unequal traffic over this portion of the line, the gross tonnage eastbound being double the westbound.

It will be seen that the scheme contemplates rating trains for a 0.3 per cent. grade from Connellsville to Chicago, and from Connellsville to Baltimore, having in the former case one helper grade away from the Ohio River west, and in the latter case, double-heading trains from Connellsville to the summit, a distance of 50 miles, with a helper grade of 10 miles over the tidal ridge at Mt. Airy. Such is the general scheme, but the plans for the eastern section are subject to important modifications which may involve considerable new line, although the results which we have described will be secured almost immediately by the use of an additional helper grade of about eight miles. It is believed that the line between Chicago and Baltimore will be entirely completed within the next three years.

The scheme of improvement as outlined above applies equally to the Cleveland, Lorain & Wheeling (now Baltimore & Ohio), which is the main outlet for coal from the West Virginia country to Chicago and the lake ports.



Profile of Northerly Line Shown on Plan Below.



Profile of New Line and of Old Planes.

Plan of Old and New Lines.

Mount Airy Improvement, Baltimore & Ohio Railroad.

The Baltimore & Ohio Southwestern does not come under the same general plan of improvement, but calls for different treatment. The maximum loading on this division is eastbound grain, although at certain seasons of the year the business is fairly well balanced. The grades on the line between St. Louis and Cincinnati have been reduced to 0.5 per cent., with a number of helper grades. Surveys have been made which indicate that a 0.4 per cent. grade is practicable from Cincinnati to Fairmont. Plans are yet undeveloped for the improvement of the line from Fairmont to Keyser. Any improvement in the grades between these points is likely to result in considerable increase in the length of the line.

The order in which improvements are taken up is governed by the fact that owing to the very large percentage of low class freight taking low rates on the Baltimore & Ohio the first step towards producing net revenue is to provide for the cheap handling of coal and coke to the lakes and to the sea. This being done other improvements may be taken up; but in grade revisions curves are lightened and either double track is laid, or provision is made in permanent work for laying double track in the future.

Improvements on the First Division.—We may now take up the work in some detail. The first division of the main line is 90 miles from Baltimore to Brunswick. Here the first important work is at Ilchester. A revision of the line here involves a tunnel 1,400 ft. long, but it saves 1,000 ft. of distance and 300 deg. of central angle of curve and reduces the maximum curves from 15 deg. to 2 deg. Reduction of grade was not aimed at here, as this is on the eastern slope, and the grade which is now from 0.25 to 0.33 per cent., falls with the load.

We may say here that the Chief Engineer has laid it down as an aphorism that on the eastern slope, an improvement of line at any one place involves a tunnel or two bridges, which one may understand if he will look at a topographical map.

Improvements at Union Dam, Sykesville, Morgans and Reel's Mill, include four short tunnels and save 754 deg. of central angle and 2,225 ft. of distance, and reduce curves of 13 deg. and 10 deg. to 7 deg., 4 deg., etc.

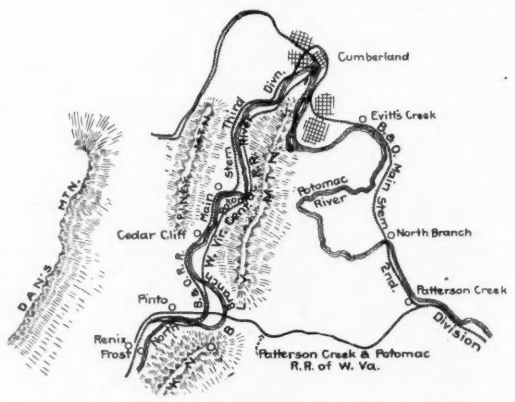
The most important improvement on this division is at Mount Airy, and this is also of historical interest. The plan and profile herewith show the improvement. In 1828 to 1831 the original line of the Baltimore & Ohio Railroad was laid down as far as Point of Rocks on the Potomac, crossing the mountain by the use of four inclined planes. When it was decided to work the line by adhesion engines it was diverted to the north, as shown on the plan. The improvement now made involved the relocation of about 12 miles and returns almost to the original alignment, and a tunnel of 2,750 ft. is run under planes Nos. 2 and 3. The saving in distance is 3,270 ft. The grades are reduced from a maximum of 1.6 per cent. to 0.85 per cent. The curvature saved amounts to 449 deg. of central angle, and the maximum curve is reduced from 9 deg. to 5 deg.

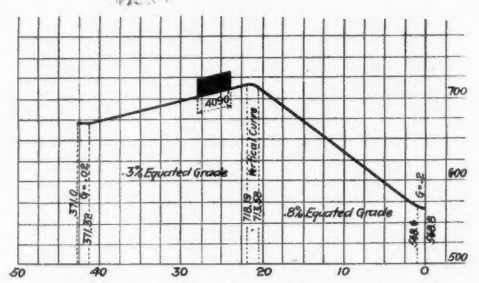
The history of the old Mount Airy Line is told at great length in the records on file at the general offices of the Baltimore & Ohio, and from those records we give a few points.

Surveys were organized in the spring of 1828. The instructions were that, going west, an ascent of 13 ft. in a mile, or eastbound a descent of 13 ft., was preferable to a level. An ascent of 30 ft. per mile west was to be regarded as the equivalent of a level going east, and any ascent exceeding 30 ft. per mile westward, and all ascents eastward, were to be regarded as inclined planes on which provisions must be made for an increased motive power in some proportion to the rate of ascent. These conclusions were based on the supposition that the loads would be in the proportion of five tons eastward to one ton westward; that the weight of a carriage to that of its load would be as one to three, and that the resistance from friction would equal $^1/_{175}$ of the entire load.

Construction was actually begun July 4, 1828, by Charles Carroll, of Carrollton, at the "first stone" back of Mount Clare, near Baltimore. By October, 1829, the location of the entire line to Point of Rocks had been completed, except about 12 miles over Parr's Ridge. In January, 1830, Mr. Jonathan Knight was appointed the first Chief Engineer of the Baltimore & Ohio Railroad Company, and by the end of September about 70 miles of single-track railroad had been laid, being then the longest continuous line of railroad built in America or Europe.

In June, 1831, the final location across Parr's Ridge was made. This involved four inclined planes, two on each side of the summit, as appears on the plan and profile herewith. These four planes aggregated 10,250 ft. long, while the levels connecting them were 8,561 ft. long. The height overcome by the planes on the eastern side was 178 ft., and on the western side 241 ft. It was decided that the grades approaching these planes could be worked by horses, one horse hauling two cars, the gross weight of one car and its load being 7,200 lbs. Two horses could haul six cars, "which would probably be as many as it will be expedient to allow to compose





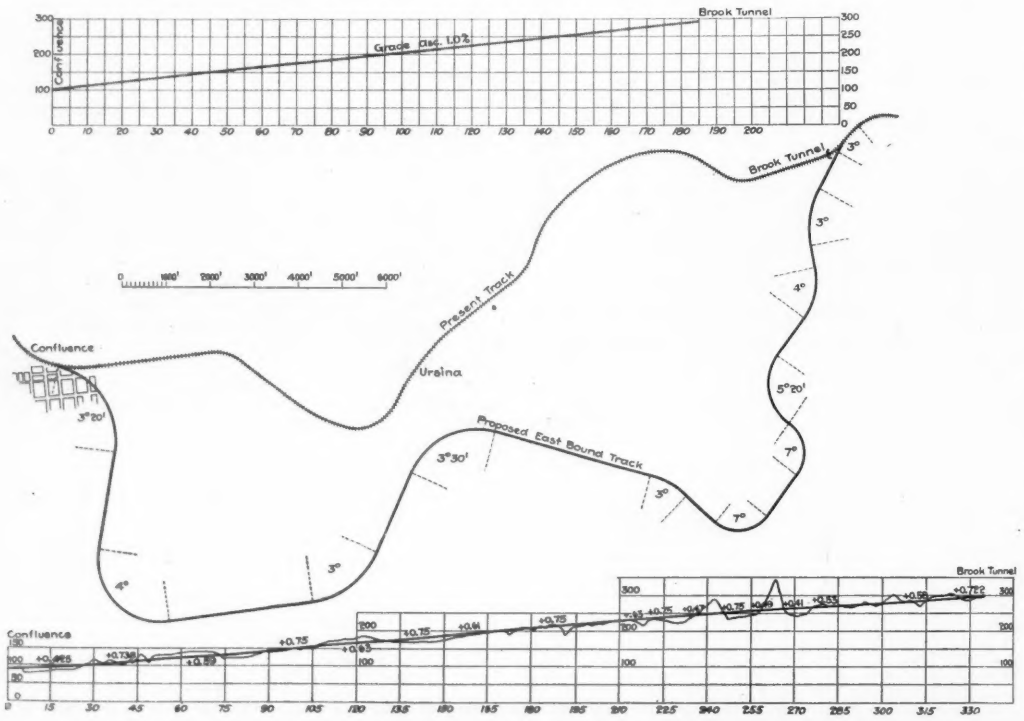
Plan and Profile of Patterson Creek Cut-off, Baltimore & Ohio Railroad.

a train on the inclined planes." If planes Nos. 1 and 4 had been rejected, the uniform grade to be worked by horse power would have been 80 ft. per mile, and each car would have been a load for one horse. Consequently, by these planes "the capacity of the railroad is doubled, whether the moving power shall be that of animals or steam by locomotion." It was believed that it was not desirable to extend this method of working by inclined planes any farther because it would be an expensive method of working "at least until the road shall reach the coal mines, when the expense of steam power will probably be reduced one-half."

Of course, it was proposed to work the planes by stationary engines and cables. The location included a cut at the top of the ridge 600 ft. long and 20 ft. greatest depth. This location across the ridge, including the inclined planes, was completely staked out for contract by June 16, 1831. The entire line was planned as a double-track road on stone stringers, but it was later decided to lay both tracks with wooden stringers.

The design of the stationary power for the inclined planes was placed in the hands of Ross Winans, who, in October and November, 1831, proceeded to procure materials to do the preliminary work for installing machinery. After some $13,000 had been spent, it was decided that the amount of traffic would not warrant the installation of the power plant, and that it would be cheaper to work the planes with horses.

The planes were worked by horse power for several years in spite of a constantly increasing traffic, but the use of locomotives was soon extended over the entire line, excepting within the City of Baltimore and over the Parr's ridge planes. In December, 1834, a locomotive called the "Arabian" was tested on the planes. It ascended for two-thirds of a mile on an average grade



Low-Grade Eastbound Track, Confluence to Brook Tunnel, Baltimore & Ohio Railroad.

of 264 ft. per mile, with two cars full of passengers, hauling, including the tender, 11 tons, the engine itself weighing 7½ tons. This led to a new consideration of the subject of relocating the line, so as to work entirely by adhesion engines, but this relocation was delayed for a considerable time. In October, 1836, Mr. Louis McLane became President of the B. & O., and he shortly caused surveys to be made for a new line across Parr's ridge. This line was put in operation in June, 1839, and about 48 hours was saved in the time of the transit of freight between Baltimore and Harper's Ferry.

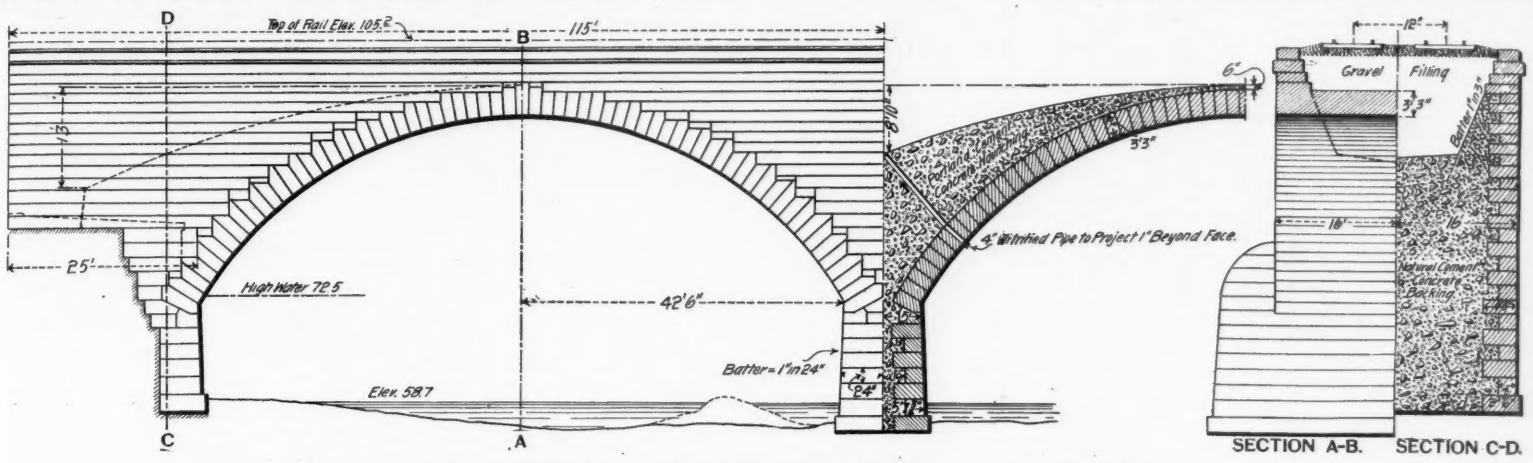
We may now return to the recent improvements. Between Washington Junction and Adamstown a detour line has been built 4½ miles long, which substitutes 0.3 per cent. grades compensated, for 0.6 per cent. uncompensated. These improvements permit the loading of trains over the division eastbound on a basis of 0.3 per cent. grades, using a helping engine on the west side of Mount Airey for 10 miles from Reel's Mill to the summit. About half of these improvements are now in use, and they will be completed by the first of 1903.

The Second Division.—The Second Division is from Brunswick to Cumberland, 102 miles. Here trains are rated on a basis of a 0.3 per cent. grade eastbound, using helping engines at three points, where the grades are 0.5 and 0.75. The improvements now going on will do away with these helper grades.

Patterson Creek Cut-Off.—The most important improvement on this division is the Patterson Creek & Potomac River cut-off, from Patterson Creek east of Cumberland to Pinto, west of Cumberland. This is shown in plan and profile in the engravings. The saving in distance is 10.5 miles. The heaviest eastbound grade is 0.3 per cent. as against a virtual grade of 0.75 per cent. on the old line. The saving in curvature is considerable, as seen from the plan, being 808 deg., the maximum curve on the new line being 6 deg. as against 9 deg. 30 min. on the old. But this cut-off has two further advantages. It permits traffic to be run through without going into the Cumberland yards, a matter of some importance, for the topography is such as to make it difficult to get commodious yards in Cumberland. A further advantage is the facility which this new line offers for getting coal out of the George's Creek district. All of the coal brought out now has to be hauled over the ridge, being delivered to the Baltimore & Ohio at Cumberland by the Cumberland & Pennsylvania Railroad. By the construction of the new line, this coal can be taken from the mines to the seaboard in standard trains, effecting also a considerable saving in distance.

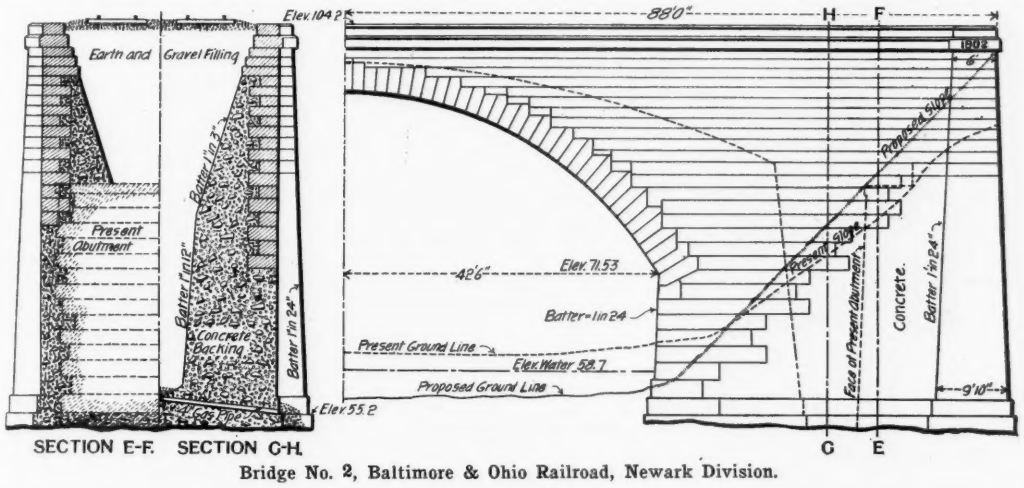
Connellsville Division.—The Connellsville Division is 93 miles from Cumberland to Connellsville. From Connellsville east the controlling grades will be 0.75 per cent., with the exception of about eight miles of 1 per cent. grade upon the western slope. Surveys have been made with a view to reducing this latter to 0.75 per cent. It is proposed, when this is done, to operate the division with standard trains (2,800 to 3,000 tons), double heading from Connellsville to the summit. In brief, the standard train will be run from Connellsville to Baltimore.

The changes on this division to secure this result have been minor grade reductions at various points, including lowering of the grades of two short tunnels. Besides these changes a detour was made from Confluence to Brook tunnel, as shown by the plan and profile. Here a long 1 per cent. grade was reduced to 0.75 by a sacrifice of 1½ miles in distance.



Bridge No. 2, Baltimore & Ohio Railroad, Newark Division. Big Walnut, Ohio.

Triple 85-ft. Arches. Span, 85 ft.; Rise, 24 ft.; Width, 32 ft.; Radius, 49 ft. 7$^{9}/_{16}$ in. Length of Intrados, 102 ft. 0$^{27}/_{32}$ in.



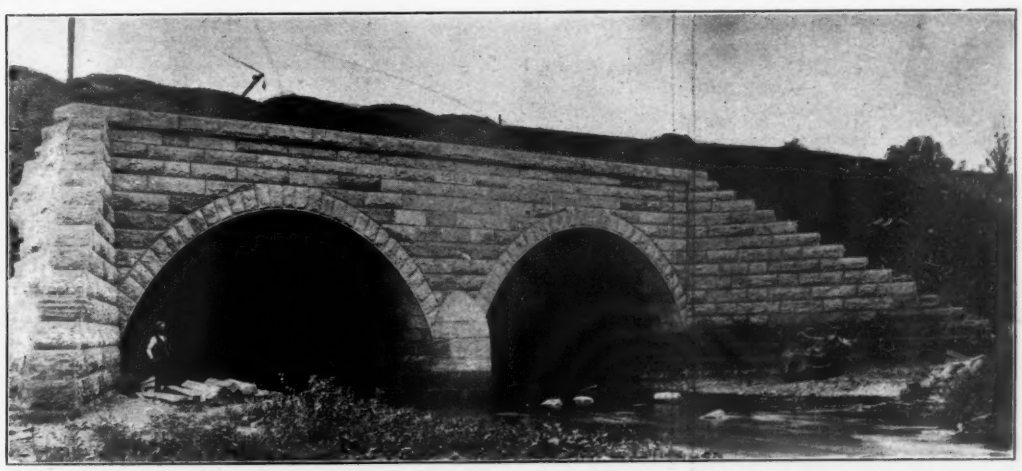
Bridge No. 2, Baltimore & Ohio Railroad, Newark Division.

Triple 85-ft. Arches.

curves. During the double-tracking short grades have been reduced, and curves have been eased.

From Connellsville to Pittsburgh is a water grade, and this cannot be improved. A third and fourth track will be built and a large yard established, in which westbound trains will be made up to go right through Pittsburgh.

Up to two years ago the division was single track from Connellsville to Cumberland, except about 11 miles. Last year 42 miles was double tracked. The remainder, 39 miles, is under contract, and much of it is near completion. It will all be in use early in 1903. A good deal of this double-tracking was difficult and costly. The road is built in a narrow valley, the steep slopes of the hills running right down to the stream. At one point the Casselman river has been diverted to take out reverse



Bridge No. 3, Baltimore & Ohio Railroad, New Castle Division. Double 34-ft. Arch.

Pittsburgh to Chicago.—West of Pittsburgh the Baltimore & Ohio has an important network of lines, which give it good command of the coal fields, the lake ports and the great industrial and agricultural region of Ohio; but the main line from Pittsburgh to Chicago is that by way of Warren, Akron and Chicago Junction, and this is the only part of the road which we can consider now.

From Alleghany to Akron, the maximum through grade is 0.7 per cent east and 1.0 per cent. westbound, with helper grades in each direction ranging from 1.25 per cent. to 1.5 per cent. These through grades are to be reduced to the standard of 0.3 per cent. westbound, and 0.37 per cent. eastbound, with one helper grade westbound of 0.65 per cent. These changes necessitate the relocation of the line at a number of points, as well as numerous revisions to correct curvature and minor grades.

Surveys and estimates for the entire line from Pittsburgh to Akron have been made. The work between New Castle Junction and Cuyahoga Falls, a distance of 74 miles, has been authorized and is now being put under contract. The revision of the remainder of the line will probably be taken up next year.

From Pittsburgh to Chicago by this Akron line about 50 per cent. is still single track. Along with grade reductions goes either double-tracking or provision for double-tracking in the masonry and earth work. The plan of improvement as laid out will make a double-track line from Pittsburgh to Chicago, with grades of 0.3 per cent. westbound and 0.37 per cent. eastbound, with only one helper grade, close to the river. The curves as far east as Warwick (east of Akron) will not exceed 1 deg. 30 min., and generally will not be above 1 deg. The balance of the line to New Castle Junction will have very little curvature sharper than 2 deg. In short, the Chief Engineer thinks that there will not be another railroad in the United States (probably in the world) which will be as good as the 430 miles from South Chicago to New Castle Junction in grade and line. Probably this is true, if we take into account also the length of the line.

The permanent structures will be of a high class. The short span openings are all being replaced by stone or concrete arches or by short girders with ballast tops; thus all the openings are to be taken out except the crossings of the larger streams.

The Work in Detail.—We will now take up the improvement of the line from Pittsburgh to Chicago somewhat in detail.

Between Allegheny and Akron the programme includes the following items authorized for immediate construction:

The construction of a large terminal and yard of about 1,800 cars capacity at New Castle Junction.

Second-tracking the line between New Castle Junction and Hazelton, a distance of 14.2 miles.

The reconstruction and second-tracking of the Trumbull & Mahoning line from Hazelton to a point on the south side of the Mahoning River at Niles, a distance of 8.52 miles.

The reconstruction of the line from Niles to Cuyahoga Falls, a distance of 39.3 miles. This is to be built double-track, with necessary passing tracks, etc. This line shortens the present line between 5 and 6 miles, eliminates a very large amount of curvature, leaving little curvature above 2 degrees, and reduces eastbound grade from 0.6 to 0.37 per cent., and westbound grade from 1 to 0.3 per cent.

This makes a maximum grade between Chicago and Allegheny of 0.37 per cent. eastbound and 0.3 per cent. westbound, with one helping grade of 0.65 per cent.

On the New Castle Division the following is under way:

Reduction of grades and second track, Chicago Junction to Nova, 24.6 miles; also double-track passing siding layouts (switches handled from tower) at Greenwich and Nova, 2.6 miles each; grades reduced from 0.7 to 0.3 west and 0.37 eastbound, maximum.

Reduction of grade, Rittman, 2.0 miles, from 0.5 to 0.3 west and 0.37 east.

On the Newark Division the following is completed:

Newark yard; revised and enlarged.

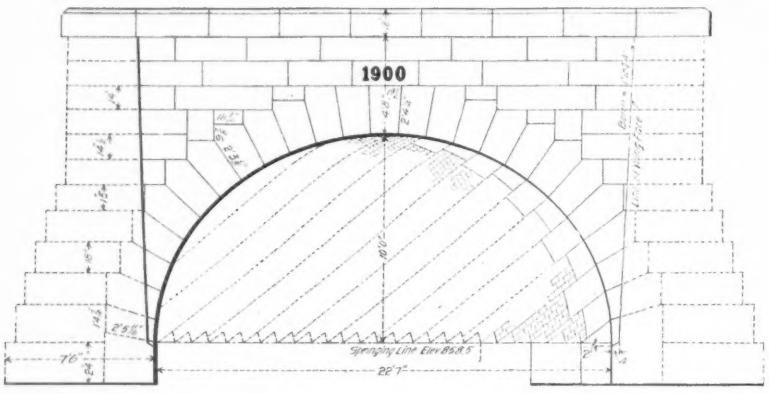
Reduction of grades at Utica, Hunts, Mt. Vernon and Fredericktown, 12.8 miles, from 0.7 maximum to 0.45 (equated) maximum westbound.

Second track, New Haven to Chicago Junction, 3.0 miles, including one mile grade reduction from 1.0 maximum to 0.4 (equated) west and 0.6 (equated) eastbound, maximum.

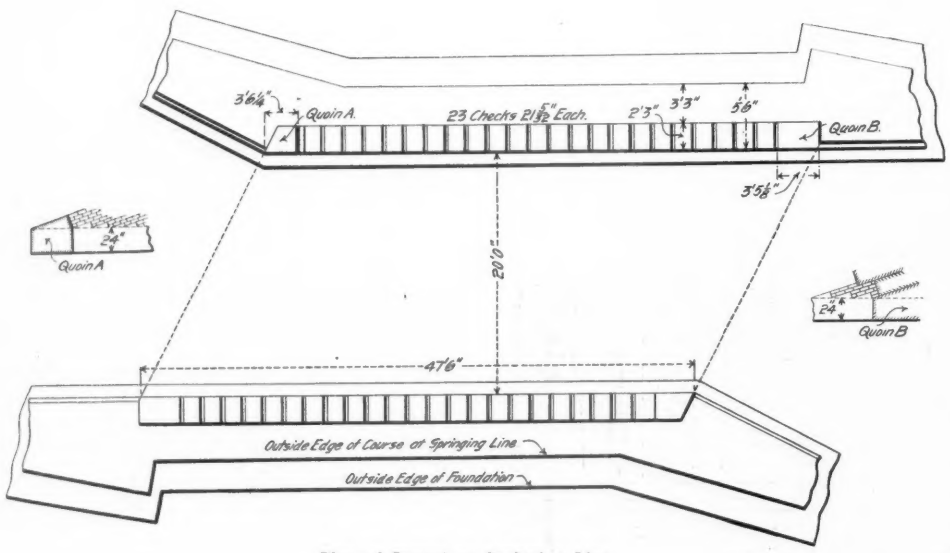
And on the Newark Division the following is under way:

Big Walnut Bridge, three 85-ft. stone arches, 50 ft. high; Sunday Creek Railroad, 5.0 miles main track, 4.0 miles sidings, to reach coal field in Perry and Morgan Counties, Ohio. Maximum grade with loads 1.5 (equated) and with empties 2.0 (equated).

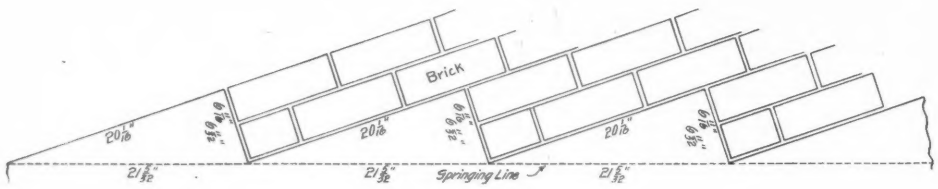
The reader will doubtless understand that the Newark Division is not a part of the main east and west line; the grades on this division do not affect the make-up of trains on the main line.



Baltimore & Ohio Railroad, Western Lines. Bridge No. 46, 20-ft. Skew Arch.



Plan of Impost at Springing Line.



Elevation of Impost.

Bridge No. 46, 20-ft. Skew Arch.

On the Chicago Division the following is completed:

Calumet River draw-bridge, renewed and changed from single to double track structure.

Wolf Lake, large terminal yard for Chicago built.

Second track, Willow Creek to Wilsons, 8.5 miles, including double track passing siding layout (switches handled from tower) at Millers, 2.6 miles.

Reduction of grade, Teegarden, 6.0 miles, from 0.6 to 0.37 maximum eastbound. The work was of necessity done in such manner as to provide grade for second track over large part of the distance.

Reduction of grades at Milford Junction, 3.1 miles, and at Gravelton, 3.0 miles, from 0.6 to 0.3 west and 0.37 eastbound, maximum. The work was done in same manner as preceding

Reduction of grades at Albion, York, Kimmell and Cromwell, 11.5 miles, from 0.7 to 0.3 west and 0.37 eastbound, maximum, the work being done in the same manner as next preceding.

Second track, Garrett to Avilla, 6.4 miles, and change of line from one mile west of Garrett to Ripley, 8.6 miles, to obtain 0.3 westbound grade in place of 0.65 on old line. Garrett yard, entirely remodeled, enlarged and formed into a double yard for east and westbound business.

Second track, Mark Centre to Auburn Junction, 23.5 miles, including double track passing siding layouts (switches handled from tower) at Rosedale and Concord of 2.6 miles each; also new water stations at Rosedale and Concord; also grade reduction, Hicksville, 7.5 miles, from 0.6 to 0.3 westbound, maximum.

Second tracks, Chicago Junction to Hamler, 71 miles, including double track passing siding layouts (switches handled from tower) at Attica, Tiffin, Fostoria, Galatea and Deshler, 2.6 miles each, and new coaling station of latest model at Deshler; also grade reduction Republic and Tiffin, 20 miles, from 0.6 to 0.3 west and 0.37 eastbound, maximum. Chicago Junction yard, 6 miles additional tracks.

Mention has been made above of a yard to be built at New Castle, and also of the rebuilding of the Connellsville yard. It is the purpose to provide five great classification yards, namely, at Keyser, Fairmont, Holloway, New Castle and Connellsville. The New Castle yard will be a clearing yard for eastbound business and the Connellsville for westbound, while the yard at Fairmont will be established for coal distribution and storage and distribution of empties.

Examples of some of the masonry bridges on this western line are shown in engravings herewith. These are fine specimens of stone and concrete arches. The skew arches are genuine skews, being exactly laid out, in the old-fashioned painstaking way, all of the elements having been calculated and plotted. The use of the concrete backing is well shown in some of the engravings, the concrete being carried well up against the face wall to drain the water away from the stone masonry.

This notice of a great work of reconstruction should not be closed without mention of the names of the engineers immediately responsible for design and execution. Mr. J. M. Graham is Chief Engineer and Mr. P. H. Irvin Assistant Chief Engineer at Baltimore; Mr. Paul Didier, Assistant Chief Engineer at Allegheny, and Mr. A. M. Kinsman, Engineer of Construction at Akron. Of course there are several others entitled to mention in this list, but it is hardly practicable to give all their names.

Subjects and Reporters—International Railway Congress.

The seventh session of the International Railway Congress will be held in Washington, D. C., May, 1905. The questions and the reporters follow:

SECTION I.—WAY AND WORKS.

I.—Wooden sleepers or crossties. Selection of species of timber used and processes of preservation.

A. Study of the selection of kinds of wood and of the processes of preservation of railroad sleepers or ties.

Reporters:

America.—Mr. J. W. Kendrick, Third Vice-President, Atchison, Topeka & Santa Fe Railway, Chicago, Ill.

Other Countries.—Mr. Hausser, ingénieur en chef de la voie de la Compagnie du chemin de fer du Midi français, Paris, boulevard Haussmann, 54.

B. Study of the causes of the deterioration of wooden sleepers or cross-ties in tropical climates and of the methods for preventing such deterioration.

Reporter:

All Countries.—The Director of Railroad Construction in India. The Public Works Secretariat, Calcutta.

II.—Rails for lines with fast trains.

Cross-sections of heavier rails; manufacture and inspection; best metal to use for rails and tires; nickel alloys; rail joints; improvements in suspended joints; experiments with supported joints; experiments with a view to reducing the number of joints; methods for preventing creeping especially on double-track lines and on steep gradients.

Reporters:

America.—Mr. P. H. Dudley, Inspecting Engineer, New York Central & Hudson River Railroad, New York City.

Other Countries.—Mr. Van Bogaert, ingénieur en chef, director aux chemins de fer de l'Etat belge, Bruxelles, rue Belliard, 76.

III.—Improved rail crossings (frogs).

Improvements in rail crossings; spring frogs, movable point frogs and crossings and continuous rail crossings in which the gap at the throat of the frog is done away with, which shall satisfy all the requirements of modern traffic and stand heavy locomotives being run over it at high speed without any shock.

Reporter:

All Countries.—Mr. G. W. Kittredge, Chief Engineer, Cleveland, Cincinnati, Chicago & St. Louis Railway, Cincinnati, Ohio.

IV.—Concrete and imbedded metal.

The use of concrete strengthened by the use of imbedded metal in railroad works.

Comparison, from the point of view of cost, of bridges of concrete strengthened by the use of imbedded metal, with those of metal.

Reporters:

America.—Mr. J. F. Wallace, Assistant General Manager, Illinois Central Railroad, Chicago, Ill.

Russia.—Mr. Serge de Kareischa, conseiller d'Etat, professeur à l'Ecole des voies de communication, inspecteur adjoint des trains impériaux et président du bureau des conférences consultatives des ingénieurs du service de la voie, Saint-Pétersbourg, Kousnetchny pereoulok, n° 18, log. 6.

Other Countries.—Mr. W. Ast, conseiller de régence, directeur de la construction due chemin de fer autrichien Nord Empereur Ferdinand, Vienne, 50, Nordbahnstrasse.

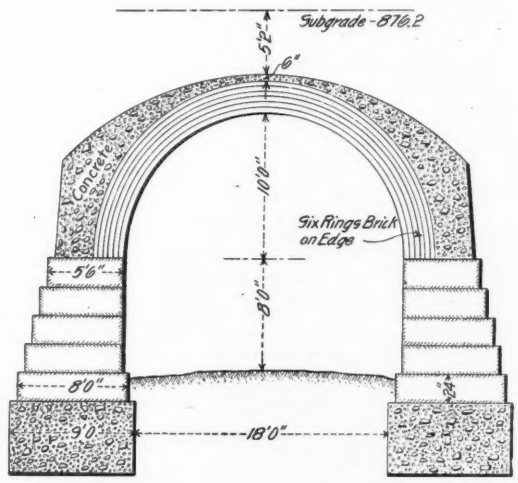
SECTION II.—LOCOMOTIVES AND ROLLING STOCK.

V (I of Section 2).—Locomotives of great power.

Increase in the power of locomotives by the adoption of high pressures and of the compound principle. Improvements in construction from this point of view. Use of nickel steel.

Reporters:

America.—Mr. W. H. Marshall, General Superintendent, Lake Shore & Michigan Southern Railway, Cleveland, Ohio.



Bridge No. 46, Baltimore & Ohio Railroad. 20-ft. Skew Arch Over Highway.

Other Countries.—Mr. Edouard Sauvage, ingénieur en chef conseil de la Compagnie des chemins de fer de l'Ouest français, Paris, rue Eugène Flachat, 14.

VI (II of Section 2).—Pooling locomotives.

The use of two or more crews.

Advantages and disadvantages of the practice and the result of such common use with respect to the efficiency and the care of the locomotive.

Reporters:

United States.—Mr. G. W. Rhodes, Assistant General Superintendent, Burlington & Missouri River Railroad in Nebraska, Lincoln, Neb.

Other Countries.—Mr. Hubert, adminstrateur des chemins de fer de l'Etat belge, Bruxelles, rue de Louvain, 13.

VII (III of Section 2).—Automatic couplers.

Advantages and disadvantages of automatic couplers.

Improvements effected in their construction. Their use in conjunction with other couplings.

Reporters:

America.—Mr. W. W. Atterbury, General Superintendent of Motive Power, Pennsylvania Railroad, Altoona, Pa.

England.—Mr. W. F. Pettigrew, Locomotive, Carriage and Wagon Superintendent, Furness Railway, Barrow-in-Furness.

Other Countries.—Mr. G. Noltein, membre du conseil d'administration du chemin de fer de Moscou-Kazan, Moscou

VIII (IV of Section 2).—Electric traction.

Progress made in electric traction on important lines of railroads. Continuous current, alternating current, polyphase current.

Experiments made with high tension currents.

Reporters:

America.—Mr. W. D. Young, Electrical Engineer, Baltimore & Ohio Railroad, Baltimore, Md.

France.—Mr. Paul Dubois, ingénieur des ponts et chaussées, ingénieur du service central de la traction du chemin de fer d'Orléans, Paris, boulevard de la Gare, 41.

Great Britain and Belgium.—Mr. Ernest Gerard, inspecteur général, chef de cabinet du ministre des chemins de fer de Belgique, Bruxelles, avenue des Arts, 25.

Other Countries.—Mr. Victor Tremontani, ingénieur, chef de section au service central de l'entretien des chemins de fer italiens de la Méditerranée, Milan.

SECTION III.—WORKING.

IX (I of Section 3).—(Jointly with Section 2: "Locomotives and Rolling Stock.") Lighting, heating and ventilation of trains.

Improvements made in the lighting, the heating and the ventilation of trains.

Reporters:

America.—Mr. C. B. Dudley, Chemist, Pennsylvania Railroad, Altoona, Pa.

Other Countries.—Mr. Cajetan Banovits, conseiller ministériel, directeur du matériel et de la traction des chemins de fer de l'Etat hongrois, Budapest.

X (II of Section 3).—Automatic block-system.

What are the recent improvements in automatic block-signaling apparatus, and what progress has been made in their introduction?

Reporters:

America.—Mr. C. H. Platt, General Superintendent, Western District, New York, New Haven & Hartford Railroad, New Haven, Conn.

Other Countries.—Mr. Margot, ingénieur adjoint à la direction de la Compagnie des chemins de fer de Paris à Lyon et à la Méditerranée, Paris, rue Saint-Lazare, 88.

XI (III of Section 3).—Baggage and express parcels.

A. Baggage.—Handling and protection of baggage. Methods for avoiding detentions, losses and diversions in transporting.

Reporter:

All Countries.—Mr. Geo. H. Daniels, General Passenger Agent, New York Central & Hudson River Railroad, New York City.

B. Express Parcels.—Handling and protection of express parcels for quick or slow delivery. Methods for avoiding detentions, losses and diversions in transporting.

Reporter:

All Countries.—Mr. J. H. Bradley, General Traffic Manager, American Express Co., 65 Broadway, New York City.

XII (IV of Section 3).—Suburban traffic.

Arrangements for suburban passenger traffic.

Reporters:

America.—Mr. A. W. Sullivan, Assistant Second Vice-President, Illinois Central Railroad, Chicago, Ill.

Other Countries.—Mr. H. G. Drury, Superintendent of the line, Great Eastern Railway, London, E. C., Liverpool Street Station.

SECTION IV.—GENERAL.

XIII (I of Section 4).—Slow freight rates.

General principles and description of the different systems of rating slow freight goods.

Reporters:

America.—Mr. S. R. Knott, President, Kansas City Southern Railway, Kansas City, Mo.

England.—Mr. Smart, Secretary Railway Clearing House, London, N. W., Seymour Street, Euston Square.

Italy, Spain, France and Belgium.—Mr. Mange, ingénieur, sous-chef de l'exploitation de la Compagnie des chemins de fer de Paris à Orléans, Paris, place Valhubert, 1.

Other Countries.—Mr. W. J. Van Overbeek de Meyer, chef de la division des tarifs à la Compagnie pour l'exploitation des chemins de fer de l'Etat néerlandais, Utrecht.

XIV (II of Section 4).—Book-keeping.

Book-keeping generally. Description of the different existing systems; comparison from the double point of view of efficiency and economy. The question of adopting one uniform system on the different railways.

Reporters:

America.—Mr. C. I. Sturgis, General Auditor, Chicago, Burlington & Quincy Railroad, Chicago, Ill.

Other Countries.—Le chevalier von Löhr, ingénieur, conseiller I. R. de régence, chef de division à la direction du chemin de fer autrichien Nord Empereur Ferdinand, Vienne, Nordbahnstrasse, 50.

XV (III of Section 4).—Duration and regulation of work.

Length of time on duty and working regulations for railroad employees and laborers.

Reporters:

America.—Mr. G. L. Potter, General Manager, Baltimore & Ohio Railroad, Baltimore, Md.

Switzerland.—Mr. Placide Weissenbach, président de la direction générale des chemins de fer fédéraux suisses, Berne.

Other Countries.—Mr. Philippe, inspecteur général des lignes Nord belges, membre de la Commission internationale du Congrès, Liége.

XVI (IV of Section 4).—Provident institutions.

General principles of plans for the retirement and insurance of railroad employees and workmen.

Reporters:

Countries using the English Language.—Mr. M. Riebenack, Assistant Comptroller, Pennsylvania Railroad, Philadelphia, Pa.

Other Countries.—Mr. Lemercier, docteur en droit, secrétaire de la Compagnie des chemins de fer de l'Est français, Paris, due d'Alsace, 23.

SECTION V.—LIGHT RAILROADS.

XVII (I of Section 5).—Influence of light railroads on the main lines.

Influence which the construction of light railroads may have on the traffic of the main lines.

Co-operation of the main lines in the construction and working of light railroads.

Reporter:

All Countries.—Mr. de Burlet, directeur général de la Société nationale belge des chemins de fer vicinaux, membre de la Commission internationale du Congrès, Bruxelles, rue de la Science, 26.

XVIII (II of Section 5).—Direct financial co-operation by public authorities.

Financial co-operation by the State (General Government) and by localities interested (counties, districts, parishes, etc.) in the development of light railroads.

Results obtained in Belgium by the institution of a central authority for studying the projects, supervising the construction and organizing the working of secondary railroads, constructed with the financial assistance of the State and of the districts affected.

Reporters:

France, Belgium, England and Germany.—Mr. Colson, conseiller d'Etat, ingénieur en chef des ponts et chaussées, membre de la Commission internationale du Congrès, Paris, boulevard Saint-Germain, 139.

Other Countries.—Mr. E. A. Ziffer, ingénieur civil, président du chemin de fer Lemberg-Czernowitz-Jassy, Vienne I, Operring, 5.

XIX (III of Section 5).—(Jointly with Section 3: "Working.")—Organization of a cheap service on a main railroad's branch lines which carry little traffic and on light railroads.

Simplifications in the conveyance of passengers, parcels (express packages) and goods. Special motors and rolling stock.

Reporters:

All Countries, except America, Austria-Hungary, Germany and Holland.—Mr. Joseph Rocca, ingénieur, inspecteur principal de la direction générale des chemins de fer italiens de la Méditerranée, Milan.

Austria-Hungary, Germany and Holland.—Mr. Cornel de Tolnay, inspecteur principal, chef d'exploitation des chemins de fer de l'Etat hongrois, Budapest.

XX (IV of Section 5).—(Jointly with Section 4: "General.")

Traffic conveyed by automobiles.

Organization of services by automotors on routes where there is not enough traffic for a railroad.

Reporters:

All Countries.—Messrs. Léchelle, chef du mouvement aux chemins de fer du Nord français; Eugène Sartiaux, ingénieur, chef des services électriques des chemins de fer du Nord français, and Keromnès, ingénieur principal des ateliers de machines de La Chapelle et d'Hellemmes des chemins de fer du Nord français, Paris, rue de Maubeuge, 95.

A Gasoline Motor Inspection Car.

The accompanying engraving shows a new motor inspection car that has recently been put on the market by the Light Inspection Car Company, of Hagerstown, Indiana, the manufacturers of the Hartley & Teeter light inspection cars. This company has been experimenting in the motor field for several years, and a little over a year ago a car of substantially the same design as that shown now was put in service on the Cincinnati, Richmond & Muncie Railroad. It has been in almost constant use since that time, and has shown that it is practicable and durable, and that it can give a good account of itself in untrained hands.

The car is propelled by a small gasoline engine, of original design. This motor is of the closed crank pattern, running in oil, and runs 50 to 75 miles with one oiling. Having few parts, and no packing, it is easily cared for and not likely to get out of order unless damaged by acci-

Gasoline Motor Inspection Car.

dent. It is not sensitive to changes in the temperature and humidity. The motor uses ordinary stove gasoline, and is quite economical in its consumption, using, on the average, about three gallons per hundred miles. On one system, a party of four men recently completed a bridge inspection trip of 1,500 miles on one of these cars, using, on the entire trip, 45½ gallons of gasoline.

A speed of 20 miles an hour is readily maintained, and users report short runs at considerably higher speed. The speed is regulated by a lever convenient to the hand of the operator. Levers for starting and stopping, and for applying the brake, are also within reach of the man running the car, the brake being a very effective one, applied to the faces of both rear wheels. In the illustration, the operator is grasping the brake lever with his right hand, the other two levers being concealed by the man in front.

The weight of the car is about 500 lbs., but it is designed with a view to easy handling, and can be put on or off the track without difficulty by one man. The front wheels are attached to the axle independently of each other, so that the car is easily swung around, it being necessary to lift only the rear end, which is not excessively heavy.

An important advantage possessed by this car is that it starts from a standstill, with no pushing or pulling. The operator starts the engine by giving it a turn or two with the starting crank, takes his seat on the car, and presses a lever. The car can be stopped without stopping the motor, which is a feature that will be especially appreciated on inspection trips, where it is often necessary to make frequent stops.

A common objection to gasoline motor cars is that the vibration is excessive. On this car this feature has had special attention, with the result that the vibration is nearly eliminated.

Besides the size shown in the cut, the company makes a motor car of practically the same design with a capacity for six men, the car being amply strong to carry seven if desired. This car is equipped with a larger motor, and is capable of high speed. Besides these two regular patterns, the company is prepared to build motor cars to purchasers' specifications.

One of these cars will be shown at the convention of the Roadmasters' and Maintenance of Way Association, at Milwaukee, Sept. 9 to 11.

Acetylene Car Lighting.

Delegates and others who attended the conventions at Saratoga this year will remember the new system of car lighting of the Commercial Acetylene Company of New York. An exhibition car equipped with the system stood on the D. & H. tracks and attracted much attention among the railroad men. A paper on Car Lighting presented as a topical discussion to the Master Car Builders' Convention by Mr. L. T. Canfield, M. C. B. of the Delaware, Lackawanna & Western, discussed this system quite fully, explaining the details. As the system is being used on the D., L. & W., Mr. Canfield spoke from personal experience and observation. This paper was printed almost in full in the *Railroad Gazette* of July 11, and we, therefore, refer those of our readers who are not already acquainted with the details of this system, to that paper.

It has just been announced by the Pyle-National Electric Headlight Company, Chicago, that the general agency for this system for the United States, Canada and Mexico has been accepted by them. Mr. Edmund G. Fisher has been made manager of the Acetylene Gas Department. It is proposed to light everything about a railroad system that requires artificial light, including cars, offices, depots, signal towers, yards, etc., and many who have heretofore considered acetylene a dangerous gas from the fire risk standpoint will be interested in knowing that this system has the approval of the National Board of Fire Underwriters.

Is It Unprofessional for an Engineer to Be a Patentee?*

BY ARCHIBALD R. ELDRIDGE, M. AM. SOC. C. E.

. . . The writer would state, at the outset, that he has never applied for a patent upon any article whatsoever. . . .

Some one once said, and most truly, too, that an engineer's capital consists of his brains. His brains make up his stock in trade; his brains, or rather their products, he sells. . . . Wherefore should he then be debarred from selling those products to the best advantage to himself, provided always that they are sold openly and above board. . . . It would be manifestly wrong for an engineer in authority to specify absolutely the use of certain devices or articles of which he was patentee and owner. . . . It might also be questionable for an engineer to patent a device worked out while in the employ of a client. . . . That, however, seems to be more a point of law than of ethics. . . .

The point at issue, then, simmers down to the question: Can an engineer, working on his own lines, patent any device, which he may discover or invent, without a violation of the ethics of the engineering profession? Common sense answers "Yes," unreservedly, but ethics may answer, just as emphatically, "No."

Let it be supposed . . . that an eminent engineer . . . should stumble upon a decided improvement in egg-beaters. Would he debase the ethics of his profession by taking out a patent on his discovery or invention? The writer hardly thinks that the engineering world would decry such an action; why, then, should it object to his taking out a patent on a new and improved method of rolling steel rails? . . .

To look at the matter in another light: Perhaps for an engineer to patent an invention shows a spirit too "money-grasping," instead of working for the good of mankind. That is a pretty theory, but it will hardly hold water when put alongside of the bills rendered for expert engineering opinion and advice. . . . The writer hardly thinks it will be contended that an engineer is not in business for all the money he can make in an honorable and legitimate manner. . . .

Again, the writer does not see or hear of any objection being raised when an engineer copyrights a book which he writes or even compiles, yet, wherein, pray, is to be drawn the fine distinction between a patent and a copyright? An article, a device, a method of manufacture may be "patented," whereas a book may be "copyrighted." In either case others than the owners of the patent or copyright are restrained from using the article or the contents of the book without compensation. . . .

In conclusion, it may be stated that the very words condemning the taking out of patents by engineers, the very sentences which caused the writing of this article, are, themselves, "patented," and to reproduce them the publisher of the reproduction must pay, not in money it is true, but by printing also the full title of the paper from which they are taken, the name of the author, etc., according to the following, which is found on the title page of the "*Proceedings* of the American Society of Civil Engineers," to wit:

"Reprints from this publication, which is copyrighted, may be made on condition that the full title of paper, name of author, page reference, and date of presentation to the Society, are given."

DISCUSSION.

S. Whinery, M. Am. Soc. C. E.—The question propounded in the title of this paper is one upon which there

*Extracts from a paper presented at the meeting of the Am. Soc. C. E., April 16, 1902, and printed in the *Transactions*.

exists a radical difference of opinion in the engineering profession, particularly among civil engineers. It is a question of importance, from more than one point of view, and, therefore, it merits careful consideration. . . .

It will hardly be claimed, except by those who argue that the whole theory of patents is wrong, that the engineer is debarred by either law, morality or professional ethics from taking out a patent under any circumstances. No valid reason can exist for denying him the right to patent inventions that have no conceivable connection with, or no relation to, his profession. If an engineer invents a novel egg-beater, he may, if he chooses, apply for and accept a patent on his invention, and dispose of it for a consideration, without violating accepted moral principles, or transgressing the strictest canons of professional ethics. This much may be accepted without discussion. The only question, then, at issue is, may the engineer patent inventions which relate directly or indirectly to the profession, or to his professional work, without violating either the law, the accepted moral code, or the ethics of the profession?

It will be conceded that the public at large neither has nor can have any peculiar legal or moral claim upon a man because of his vocation or profession; every citizen owes certain obligations to his fellow-men and to organized society, and he may pay a part of these obligations in the particular kind of current funds that he may be best able to supply. . . . But how much is the public entitled to? Somewhere there must exist a line beyond which contributions to the public good must become benevolence, rather than duty. The public has a right to demand that which is duty, but not that which is benevolence. In the way of monetary or property contribution, the duty of the citizen is discharged when he pays his taxes, and the public has no right to demand or ask more.

There are but few who deny that inventions are personal property—the property of the inventor—and a patent is merely a certificate of ownership issued by the authority of the government. The public has no more claim upon the personal property of the inventor than upon the chattels or lands of other citizens; therefore, we may exclude the general public from this discussion. There are, then, left to be considered, the rights of but three parties or interests: The profession, the client of the inventing engineer, and the engineer himself.

What claim has the profession upon the inventions of its individual members?

It cannot be held that the profession has any legal right to the personal property of its members; nor can it be claimed that the member is bound by any moral obligation to contribute his property to the profession. But, outside the pale of the law and the moral code, it is recognized that the profession has claims upon its members which are not less real because they are somewhat difficult to define. They are embraced in the general term "Professional Ethics."

In the first place, the member has a material personal interest in supporting and advancing the character and standing of the profession before the public, because his own standing in the eyes of the public is affected thereby. From the material point of view, the higher the services of the civil engineer are rated, the more remunerative will be the work of the individual engineer.

Another and a higher motive is found in the fact that the character and dignity of the profession is, to a certain extent, reflected upon its individual members. Personal interest, therefore, dictates that the individual shall render such services as he may be able to the elevation of the profession at large.

A higher and still more worthy motive impels the individual to feel a pride in and be loyal to the highest interests of the profession, for the good of the profession itself, and to extend to his fellow-members the most refined courtesy and loyal assistance in all proper ways. This may be accepted as a sound general statement, but difficulty arises when we attempt to define just how far an engineer is called upon to go, in contributing from his personal property, whether material or intellectual, to the profession or to its individual members. . . . .

Inventions relating to or connected with the engineering profession may be divided into two general classes.

First, those that relate to what we may call the engineer's work-shop, such as special instruments or labor-saving appliances, for doing work, the scope of which is confined to the personal use of engineers. With regard to these, it may be an open question whether loyalty to the profession, and courtesy to its members does not require that their use be made free to all. In the medical profession it is distinctly held that it is unprofessional to patent inventions of this class. This position would be strengthened if it could be shown that the profession would reap the whole advantage of the inventor's generosity. Unfortunately, this is not always the case. For instance, an engineer may invent a valuable labor-saving instrument. It is made and sold by an instrument maker, who fixes the price, not at cost and a reasonable profit, but at what he thinks he can get, independent of any royalty the inventor might exact. The result would be increased profit to the maker or dealer, without any benefit to either the profession or the inventor. Upon the whole, however, the position of the medical profession seems reasonable and proper, and the speaker would favor its adoption by engineers.

To the second class belong those inventions that confer no special benefit upon the profession or its members, but which accrue to the benefit of clients, manufacturers, contractors, or the public at large. As a pertinent illustration we may cite improved methods or processes for dealing with sewage. The practicing engineer may very properly recommend to his clients such improved processes, whether patented or not, if he is convinced that, all things considered, including royalty, their use will result in benefit or economy to the client. But such recommendations, probably, will not add to or detract from the engineer's professional reputation or advantage, nor will it increase the fee he may charge for his services. Consequently, he receives no benefit, nor does the profession, from the use of the process. If benefit results, it accrues wholly to the client or to the public at large.

The engineer, presumably, will not recommend, and the client or the public will not use, the process, unless they believe that its use will be advantageous or profitable, and if advantageous or profitable, they cannot reasonably object to compensating the inventor. . . . Unless it can be shown that an inventor has no property right whatever in his invention, it seems preposterous to say that he is not entitled to, and may not justly collect, a fair compensation for its use. And since such use is not for the benefit of the profession or its members, it cannot alter the conclusion if the inventor happens to be an engineer. . . .

There seems to be an impression among many that, in the medical profession, it is considered unprofessional to take out patents of any kind. This is not the case. The ban is placed only upon patents for professional instruments and devices, and upon medicines and methods of treatment. The argument against patents for medicines and methods of treatment is based largely upon the consideration that they are primarily for the benefit of the sick and suffering, and that ordinary benevolence would render it unseemly to prevent their freest use, or to place a tax upon human suffering. No such argument applies to the great majority of industrial inventions, which are the special field of the engineer, and the cases are therefore clearly differential.

Coming now to the second class of parties interested, what claim has the client upon the inventions of the engineer?

Two classes of cases must be considered: First, those in which the investigations of the engineer have led to important inventions while in the client's employ, and relating to the client's business; and second, those in which the engineer may find it to the client's advantage to make use of inventions perfected by him before he entered the client's service, and quite independent of the client's business.

In cases of the first class the legal status of the two parties is well settled and clearly understood. It may be stated briefly thus: If A is an employee, say a mechanic in the business or shop of B, and invents an improved device or process relating to the business of B, A may take out a patent covering his invention. B will be entitled to make full and free use of the invention in his own business or shop, but will have no other claim upon it, and A may sell the patent in whole or in part, subject, of course, to B's right of use, as stated previously, to any other persons, not excepting the business competitor of B. . . . Unless it can be shown that the relation of engineer and client differs from that of employee and employer this must be good law and sound morals for the engineer who may happen to be an inventor; and, as professional ethics is based on the moral law, it must be sound from the ethical point of view.

Cases of the second class are embraced mainly in the first, except that there can be no possible question as to the ownership of the invention. It will scarcely be held that when a client employs an engineer he thereby acquires any right to make use of the engineer's private property, whether that property be his house, or his invention. There is one difference, however, in the two classes of cases which merits notice. The engineer may not recommend the use of his own patented invention to his client without the fullest statement of the facts, including the royalty expected, and even then may not press its use upon his client. Nor may he make use of his invention in work under his charge without the full knowledge or consent of his client, even if no royalty is charged or expected.

The third party in interest is the engineer himself. Upon his relation to the subject we must content ourselves by touching very briefly.

If neither the profession nor his client is unjustly or injuriously affected by the fact that the engineer is an inventor and patentee, he has the undoubted right to be his own judge as to whether, being an inventor, he shall, or shall not, take the necessary action to place this intellectual property under the protection of the same law that guarantees to him the exclusive use of his chattels and his lands. If he chooses to avail himself of that protection, and to control and manage that property so as to yield him its full value, he may do so without trespassing on any rights of his fellow citizens and without violating any reasonable code of professional ethics.

There can be no wrong in the engineer holding, using, or disposing of property honestly and honorably acquired. Whether that property is the result of physical or mental effort does not matter, and the possession of the one should no more subject the owner to reproach or professional discredit than the possession of the other.

There is another aspect of the matter, which, while it has no relation to morals or to professional ethics, deserves consideration. Assuming that the inventor might be actuated by pure benevolence in working out and perfecting valuable inventions for the sole benefit of the public, his object might be defeated if he declined or neglected to take out a patent.

To develop and introduce an important invention requires usually the expenditure of a large amount of money. The inventor is not often able to supply this money himself. He must seek the aid of capitalists. They will not supply the necessary means unless assured that what they invest will be returned with liberal profit. They must have some assurance that, after they have spent large sums for the development and introduction of the invention, they will be able to prevent competitors from robbing them of the reward for their labor and expenditure. This can only be accomplished through patenting the invention. Without the protection of a patent they would not supply the necessary money, and the invention, however valuable it might be to the public, would not be made available for its use. . . .

The writer believes that the time has come when the profession should take positive and unmistakable action on this question of the right of the engineer, not only to invent, but to protect his invention in the way the law has provided. Such action is due to the profession, which should not be placed in the anomalous position of being divided against itself. It is due to the individual engineer, who is entitled to know what the profession regards as professional or unprofessional. It is due to the engineer's clients and to the public, in order that they may know what to expect when dealing with engineers who may be also inventors.

James Owen, M. Am. Soc. C. E.—. . . The whole point at issue is a proper definition of the word profession, and to determine accurately what is a professional obligation in civil engineering is a very difficult problem. . . .

Taking the architect as basis for argument, it may be clearly appreciated that any one designing and also constructing a building is not acting in a professional capacity, even though it may take more brains and energy than merely to make the plans and superintend the construction. Applying this creed to engineering, any engineer who departs from a line of practice in which he is delivering to his client more than his own thoughts and ideas is departing from legitimate and professional practice; for these thoughts and ideas must and should be untrammeled by any question of individual interest of the engineer himself, and the resultant, whether delivered by letter or drawings, belongs to his client.

The first problem to be adjudicated in this controversy, and more pertinent probably than any other point, is: Is it of advantage to the engineer to be a professional man, and is it also of advantage to the country at large?

So much of the world's progress of to-day is dependent upon the free thought and careful study by engineers generally that it may be urged that by limiting an engineer's line of action to a comparatively small sphere good results may not ensue, and the pre-eminence achieved by engineers here, under such conditions, may be easily lost.

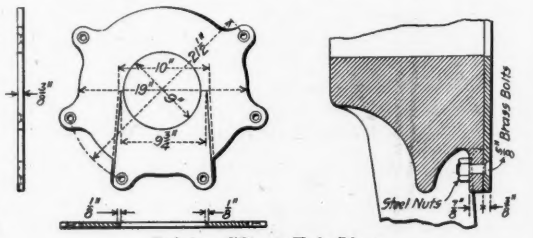
Looking carefully over the field of civil engineering, with its varying ramifications, it can hardly be said that such a result can be feared, as it shows that, as time goes on, the purely professional practice is gaining greatly on the so-called merchantable practice. . . .

Given these general outlines of professional engineering, the inference can be drawn that it is professionally wrong for an engineer to acquire an interest in any patent. If he acquires a patent and uses it there is certainly no moral delinquency, but it lowers the dignity of the profession, and lowers its appreciation by the public at large, and it is gratifying to note the public disapproval based on a report of a controversy which has arisen in a large city where a professional engineer has attempted to force the use of a patented article on construction work over which he has control. . . .

Shop Notes.

DRIVING WHEEL HUB LINERS.

The use of a hub liner on driving wheels is, of course, a necessity when the boxes or hubs have become worn, and all sorts of liners have been designed. Some of them are good and serviceable, while others are the reverse.



Driving Wheel Hub Liner.

Among designs that have much to commend them is that of Mr. F. T. Hyndman, formerly Master Mechanic of the Pittsburgh & Western, and now Division Master Mechanic of the Buffalo, Rochester & Pittsburgh.

Provision is made on the casting of the driving wheel center for fastening the liner by through bolts as shown in the engraving of the section of the hub. The plate is made in two pieces, as shown in the face elevation, and these are of such shape that they can be slipped on over the axle without removal of the wheel. The plate is of brass and is held by six 5/8-in. brass bolts with countersunk heads. Four of these bolts are used to hold the main piece and the other two fasten the filler in position.

The driving boxes have the inside faces of the flanges

tapered from the center out to both the top and bottom, in accordance with what has now become common practice so that the box can remain seated on the axle and with its face against the wheel hub, practically uninfluenced by the rolling of the frame.

CAST-STEEL OIL CUPS.

An economy has been introduced in one of the small items of locomotive work by the substitution of steel castings for brass for oil cups. Not only is the metal less expensive in first cost, but there is no inducement for thieves to remove and steal so that loss and annoyance from this source is entirely eliminated.

DRYING CARS.

In the paint shops a drying pipe is laid on the floor between the tracks. This makes it possible to do rapid work when it is required on any one or more cars, by turning steam into the pipes beneath the cars to be operated upon and thus causing a gentle current of warm air to rise up from beneath the car and flow upward over its sides.

The Boston Pneumatic Tube Service.

BY E. D. SABINE.

The problem of delivering packages is one that confronts every retail dealer in every line of goods. The wholesale merchant can confide his goods to the railroad or steamship company, knowing that at the other end his consignee will unload and take care of the shipment. But the distributor is facing a different problem. He must leave his goods at the homes of numerous customers, each and every one of whom expects his order to receive immediate attention. This becomes a serious matter in the large cities where the population covers a vast area.

The American Pneumatic Service Company has instituted a novel method of distributing parcels by installing an underground pneumatic tube system in Boston. A central station has been erected in the very center of the retail shopping district at the head of Harrison avenue. From this station two pairs of tubes are laid, one pair running to the Back Bay sub-station on West Newton street near Huntington avenue. The other pair runs to the south end sub-station on Washington street, near Brookline street. From the south end the line is continued to the Dudley street station in Roxbury, near the terminal of the elevated road, and from Roxbury it runs to the Dorchester sub-station at Upham's Corner. The parcels are collected from the stores by teams and brought to the central station. There they are sorted and sent by tubes to the sub-stations above named, and delivered from them by team or messenger. The average time of transit from the central to the Dorchester station is about 10 minutes as against 40 minutes by team.

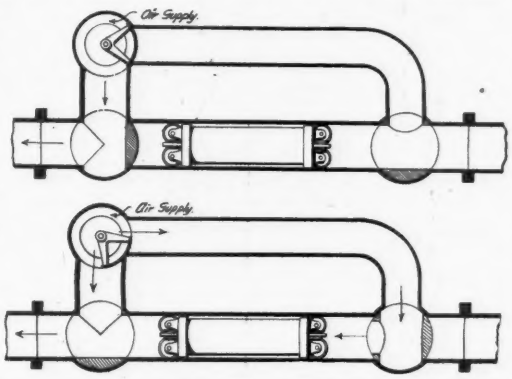
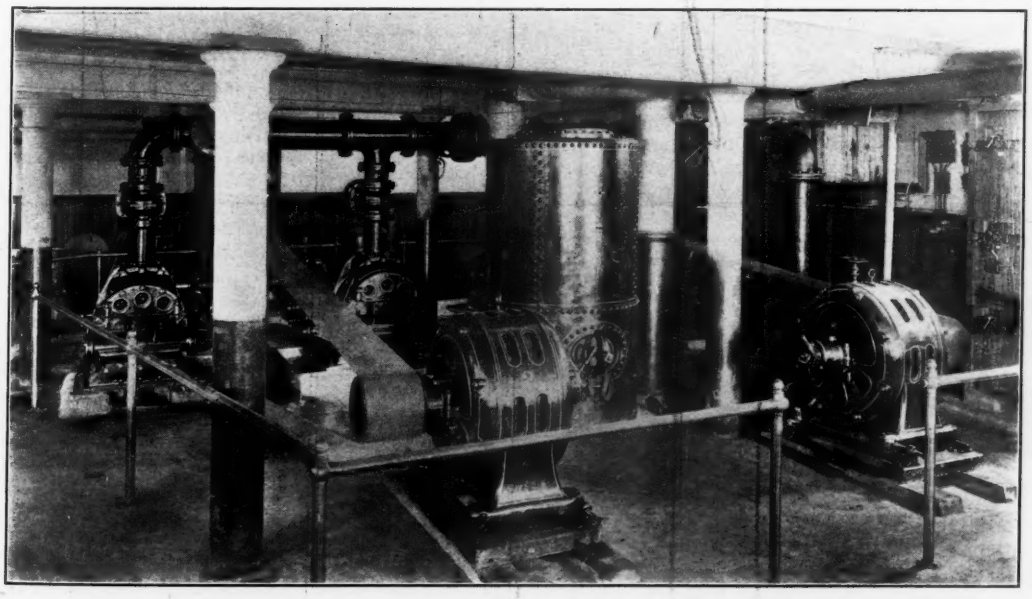


Diagram Showing Air Lock—Boston Pneumatic Tube Service.

The tube is operated by compressed air, which forces a carrier along in a manner similar to that in use in the familiar store service cash system. The air required is about 1,400 cu. ft. per min. at an average pressure of 1.9 lbs. With the lines filled with carriers this pressure may rise to as much as 2.1 lbs., and in the shorter lines, with no load, it falls off to 1¾ lbs.

Terminal Station—Boston Pneumatic Tube Service.



Electrical Driven Air Compressors—Boston Pneumatic Tube Service.

Before entering the compressors the air passes through a tank filled with calcium chloride, which effectually removes all moisture. This tank is open to the atmosphere, and the pipe connections are so arranged that the air of the incoming line passes through the tank and returns to the compressor. Only such air has to be dried as is lost through leakage or used for operating the machines.

The compressors are duplex belt-driven with 24 in. x 12 in. cylinders. There are two each at the main, south end, and Roxbury stations, and one each at Dorchester and Back Bay. The compressors are driven by 50 h.p., three-phase induction motors of the internal resistance type. The idea of belted compressors and electric motors was adopted after a long investigation into the relative merits of steam, gas and electric power. Steam was early abandoned because of the necessity of having a licensed engineer at each plant, and on account of the room required for boilers, coal bunkers, etc., gas engines appeared attractive on the score of economy, but it was decided that a power was needed that could be more easily controlled; that is, one where the starting or stopping of the compressor would be an easier matter. Turning naturally to electricity, the decision lay between direct and alternating current. The induction current motor with no commutator to burn out, with no danger of burning out the armature, and its high efficiency at half load, was finally adopted. The motors have been running for a year, without giving the least trouble, and with a total bill of repairs of less than five dollars, all of which was for paint.

The carrier used is a complete departure from all previous designs. Instead of using felt or some other substance for bearing rings on which the carrier can slide, five wheels are placed on each end of the carrier. The heads which carry the wheels are slightly flanged and it is found that the air that leaks by is not sufficient to be noticeable. The cover is hinged on the side, opening the whole length of the carrier, and nearly one-half its circumference. It is locked by a trident at each end which slips into holes drilled in the head. Such a heavy carrier cannot be allowed to come out of the open end of the tube the way that small carriers do in the store service systems. The receiving terminal is an air cushion closed at one end by a revolving valve which is opened and closed by a cylinder and piston operated by compressed air from the tube. Normally this valve is closed. When the carrier enters the receiver it compresses the air in front of it. This pressure affects a small auxiliary valve. When the carrier is brought nearly to rest the auxiliary over-balances and moves the controlling valve of the main cylinder. This opens the revolving valve and allows the carrier to roll out. Just at the end of the receiver two vanes are mounted so that the pressure of the air behind the carrier tends to move them. This motion is made use of to restore the auxiliary valve to normal position and close the receiver. As the current of air is kept flowing all of the time, it is necessary to have some method of introducing the carrier into the tube. This is done by a simple adaptation of the air lock (see diagram). The valves are moved in the proper sequence by one cylinder controlled as in the receiver.

Parcel Carrier—Boston Pneumatic Tube Service.

The pipe used is cast-iron water pipe, machined at the joints to make a close fit. It was laid in the same manner as water pipe, with lead and yarn joints. The curves are of cast-iron, 12 ft. radius to center line, the circular section of the straight pipe becoming elliptical at the bend. The bends were cast in sections, the standard 90-deg. bend consisting of three 30-deg. sections bolted together. In laying, the usual obstacles of manholes, sewers, water and gas pipes and electrical conduits were encountered. To add variety to the work, the foundations of the elevated road and the roof of the subway had to be avoided. On Harrison avenue a long stretch of soft mud was encountered which made it necessary to excavate below grade and put in a bed of good bank gravel. This, when well rammed, made an excellent foundation. Work was commenced Sept. 4, 1900, and the first carrier was sent through on March 10, 1901. Business was commenced June 1, 1901, and has been carried on steadily ever since.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

All authorities agree that immense crops are practically assured. The *Chronicle* speaks of the crop prospects as "superb" and *Bradstreet's* says that the crops will, in most instances, be the largest ever gathered. The indications are now that the corn crop will amount to 2,500 to 2,700 million bushels. At 2,500 million, this crop would be about 1,000 million bushels greater than last year and considerably the best ever made. While the average condition is not as high as it was in 1896, the area planted is about 14 million acres larger. The wheat crop is not quite so promising, but the prospect is of a crop, in the aggregate, far above the average, namely, 652 to 675 million bushels, including Spring and Winter wheat. It is pretty certain that the crop of oats will be the largest recorded, and it is believed that it will be not far from 900 million bushels (say 250 to 260 million dollars). Potatoes, a very important crop in value (91 million dollars in 1901), show large gains over last year, and the acreage in hay is larger and the condition better than the average. All of this means continued prosperity, and it means an enormous business for the railroads, not only in moving the crops, but in moving general merchandise back into the farming regions. It looks now as if the earnings of the railroads would be limited only by the equipment at their command; and yet we may reasonably suppose that the amount of equipment at command will be actually a good deal greater than ever before. That is, the workings of the per diem plan of accounting will increase the car movement by an important percentage, which is equivalent to adding immediately that percentage to the amount of equipment. In fact, the railroad gross earnings even now continue to show substantial gains before the great traffic from the crops appears. The records of gross earnings for the month of July show an increase of 7.65 per cent. as compared with great earnings in July last year. The anthracite roads, however, do not appear in these returns, those roads never furnishing early statements of approximate figures. In July of last year, the gain in gross recorded was 14.06 per cent. and in July of 1900, it was 6.07; while in July, 1899, it was nearly 17 per cent. We see, therefore, the significance of a gain of 7.65 per cent. this year. All of this being so, it is beyond belief that we should not have something like a year of continued great prosperity; beyond that we need hardly speculate. The only doubt in the minds of competent and serious observers appears to be the fear that prices of all sorts of securities are so high that even great prosperity cannot keep them up; but, admitting that, the worst that is likely to happen is a period of gradual and probably beneficial liquidation.

Forty-one Rear Collisions.

In our issue of July 18, on the first page, we published a discussion of the causes of butting collisions, the text being the Government report (Bulletin No. 2) for the three months ending Dec. 31 last. The Interstate Commerce Commission has now (Bulletin No. 3) furnished the material for an equally instructive study of rear collisions.* In Bulletin No. 2 the butting collisions, costing over $2,500 each, numbered 27, with 70 persons killed, 234 injured and a total loss (cars, engines and structure) of $306,511. In Bulletin No. 3 all of the rear collisions, costing over $2,000 each, are brought together in a similar list. They number 41; total number of persons killed 43; of injured, 225, and total cost, $160,247. The statement of causes are as varied and interesting as in the former case; and, as stated in the bulletin, a similar list for both classes of collisions, rear and butting, could have been made; the emphasizing of one kind one-quarter and the other kind the next is not to be taken as an indication that there is any marked falling off in either kind either quarter.

An analysis of the present list gives the following:

Causes of 41 *Rear Collisions.*

		References.†
1.	Neglected to flag	12, 13, 17, 19, 20, 22, 24, 36
2.	Improper flagging	5, 6, 9, 27, 33, 39, 40
3.	Improper flagging and too high speed	10, 23, 25, 35
4.	Flagman failed to use torpedo	8
5.	Weather thick, flagman could not be seen	3
6.	Misplaced switch	4, 18
7.	Approached station at uncontrollable speed	11, 21, 28
8.	Ditto; and neglected five-minute rule	26
9.	Approached water station uncontrollable	1
10.	Engineman exercised poor judgment	7
11.	Engineman failed to keep a good lookout	14
12.	Engineman asleep	15
13.	Too high speed	32
14.	Runaway train	16, 34, 41
15.	Block signal wrongfully cleared	2, 30, 31
16.	Failure of automatic block signal	29
17.	Overlooked train on time-table	37
18.	Disregarded block signal	38

It goes without saying that any superintendent who should have occasion to investigate such a list as this, on his own road, would at once stir himself up to change things. We may go farther, and say that any superintendent who should study *this record*, in detail, and with his own men's records before him, would also be disposed to take up anew the question of the prevention of such episodes in his own record. A record covering 200,000 miles of road is, to be sure, somewhat vague. The percentage of lapses may be small. You still have the assurance that your share is very small. But in spite of all that, a full account of each one of these collisions reported (to say nothing of the hundreds which are mentioned only in the totals of the bulletins) would remind a railroad officer forcibly of similar misconduct and failure among his own men. And we need not say that any superintendent, whenever he has this subject vividly before him, feels the need of taking vigorous measures to grapple with it.

One of the roads which was responsible for one of the butting collisions in the former list soon afterward gave out that the block system was to be adopted on several hundred miles of its lines. Another road that had a bad butting collision in February at once took up the question of the adoption of the block system on that division where the collision occurred. Both these roads already had the block system in use on other parts of their lines, so that the merits of the system cannot have been unknown, but concrete examples seemed to be required to arrest the attention of the President or Directors or some other authority. This being the case, we feel that we shall be doing many railroad officers a good service by calling especial attention to the exhibit made by this bulletin.

For no less than 21 of the collisions in the list—all those tabulated in the first five lines of the table above—equal to more than half of the whole, it may be declared that the block system would have been an absolute preventive; and the same is presumptively true of those in the 9th, 11th, 12th and 17th lines. Wherever the fault lies with the flagman, the establishment of fixed points—block signals—at which the engineman must be prepared to stop, with the correlative fact that he need not stop at any other point, cures the difficulty. In cases of approaching a water station at uncontrollable speed it almost always turns out that dependence was placed on a guess that the foremost train had got out of the way; the block system cures this guessing. We do not say that it makes guessing impossible, but it is a matter of fact that the cure is effected. Failing to keep a good lookout (11th line No. 14) and going to sleep on the engine are not impossible with the block system; but the block system does substantially clear the record of items of this class—or clears it within a small fraction of one per cent., and the results are all that any one expects. The 17th item (No. 37) represents a cause that is positively done away with if the block system is adopted in its complete and perfect form, for with the block system there is no need of any time-table whatever. Any train getting the right to the road keeps it, regardless of its class, until it reaches the next station, whether it be 5 minutes or 5 days in getting there; and no work train, or empty engine, or switcher thinks of trying to take that right from its possessor except through the block signal man.

The 15th and 16th items we will take up presently. The 18th represents a dereliction which belongs in the same class with many of those found in Bulletin No. 2 (butting collisions). The need of inspection and discipline is equally obvious in both cases. This collision (No. 38) is the one case out of the whole 41 in which it is clear that the block system did not prevent the engineman from being fatally negligent. By referring to the bulletin, where this engineman's negligence is remarked upon, the reader will see that the collision was not due to any fault in the block system.

The 15th and 16th items (cases 2, 30, 31, 29) are the most significant in the table, as they represent failure to attain safety even after the most important measure of safety, the block system, has been adopted. The automatic block signal failure represents a danger which every road using such signals is, doubtless, endeavoring with constant faithfulness to do away with. At any rate, every signal engineer that we know is studying his problems with energy, and seems to be determined to make his record perfect just as soon as it is possible to do so. Managers seem to be equally persistent in demanding the highest possible attainments in mechanical and electrical features, and in inspection and care. But in cases of manual block signals wrongfully cleared we cannot find ground for such a hopeful view. It is only too evident that lapses of conduct, in this department, are directly connected with looseness of discipline or lack of thorough training. As everybody knows, the substitution of the block system for the time interval greatly enhances safety, even when the personnel is not simultaneously improved; and enough collisions have already occurred, as the records of the *Railroad Gazette* since 1890 show, to make it plain that some roads have been satisfied to effect this partial improvement. They have adopted the better system, but have not bettered their men. A few roads have adopted "lock-and-block," thus providing by machinery against some of the errors of the signalman's brain; others, not doing this, have tried to get better men or to make better signalmen out of the men they have; but in the third and larger class of roads we find that neither one of these improvements has been taken up. We do not need to repeat here the arguments which have already been published on this point, for they are well known. The principal ones may be found in the article of July 18, on butting collisions. As remarked in that article, there is no warrant for relaxing efforts at improvement of the discipline just because you have adopted the block system. Admitting the great improvement that has been made in the safety record of many roads by the abandonment of the time interval on large portions of their lines, the fact remains that we shall not come anywhere near the records of our friends in England unless we make improvement in other directions. Five collisions under the block system in three months means 20 in a year. And two things are to be remembered: seven-eighths of our railroad mileage is not worked under the block system, and so is not to be considered in averaging the record per mile of road; and the report under consideration omits cases causing less than $2,000 damage. A complete record would multiply our total by a figure of considerable size.

One item in the record (No. 14, runaways), covering three collisions, costing $21,900 and three lives, represents a cause with which the block system has nothing to do. Here again it is to be remembered that the record is not complete, the cases costing less than $2,000 each would, no doubt, materially increase the total in a year. This article has been devoted chiefly to preaching the block system, and it is long enough already; so we shall not enlarge on the subject of runaways. Possibly the only comment necessary is to call attention to the record itself. Insufficient brake power and overworked and inexperi-

*For Bulletin No. 2 see *Railroad Gazette*, June 27, p. 508. For Bulletin No. 3 see *Railroad Gazette*, Aug. 1, p. 607.

†References to numbers in column headed "G" in table in *Railroad Gazette*, Aug. 1.

enced trainmen make three counts, which every railroad manager already well understands. The importance of having the air-brake on all cars and using it is one of our old sermons; but here it is impressed in the concrete, with $5,000 and $14,000 penalties. Giving trainmen plenty of rest seems to be well enough understood when there is a discussion with a grievance committee; but as long as the men can get partial relief by sleeping in the caboose on the road everybody seems willing to swallow his principles and go in for a big car-movement record. Putting green brakemen on steep grades, where the oldest of the trainmen occasionally find use for all their wits, is such a risky proceeding that were it not for the record before us we should hardly think it necessary to argue against such a course. And on a double track road nearly every runaway train endangers, if it does not wreck, one or more passenger trains.

New Southern Pacific Bonds.

The directors of the Southern Pacific Company have announced this week that they propose to ask authority from the shareholders to issue $100,000,000 new bonds, which will be convertible into stock at the option of the holder, but also subject to call by the company. The immediate purpose of this new bond issue is to provide funds for improvement of the property without using up all the available current income, as has been the practice up to the present time. Although authority is asked by the directors to issue up to $100,000,000 of new bonds, it is proposed at the present time to issue only about $25,000,000, and these are for betterments. It is suggested that later on $25,000,000 or $50,000,000 will be issued to refund present high-rate interest bonds. Approximately $21,750,000 bonds bearing 5 per cent., 6 per cent. and 7 per cent. interest mature in 1905. The issue of 4 per cent. bonds to take up these maturing issues will mean a very considerable saving in interest charges. At the present time, therefore, we may consider that the additional issue of Southern Pacific bonds is limited to $25,000,000, the remaining $75,000,000 being reserved, presumably, for refunding.

The expenditure of this $25,000,000 of new bonds for improvement will, therefore, relieve the income account of an onerous charge for betterments, the expenditures on this account by the Southern Pacific Company, and its controlled lines in recent years, and particularly in the 1901 and 1902 fiscal years, running up to extraordinary amounts. The improvement charges in 11 months of the 1902 fiscal year were $10,950,000, and in 1901 were $6,871,000. If the property did not need heavy improvement, or if the cost of the work were not charged against the Company's income, a very large surplus available for dividends would be shown on current receipts, and it would be difficult for the directors to further resist the demands of shareholders for a distribution of dividend. A Southern Pacific director has been recently quoted as saying that the company was earning 8 per cent. on its stock, exclusive of improvements, and this is a reasonable estimate.

In the fiscal year to June 30, 1901, gross receipts were $81,107,700, including revenues from steamers and income from other sources. Surplus over all charges, however, was only $3,456,600, equal to about 1.75 per cent. on the approximately $198,000,000 stock outstanding. But cost of improvements and new equipment charged against income was $6,871,000, or nearly 3½ per cent. on the shares, and there were other heavy special advances, charged off, against current income. In 11 months to May 31, last, gross transportation receipts on 8,763 miles of road (against 8,681 miles operated in the previous year), were $77,079,008, an increase of $6,129,400, while net earnings after taxes were $25,295,992, an increase of only $804,200. Miscellaneous receipts were over $1,000,000 in this period, but besides the fixed charges, deductions of $10,950,073 were made for the cost of improvements, and new equipment, leaving a surplus of only $421,775. These improvement charges were in themselves equal to over 5½ per cent. on the outstanding stock, and to over 12 per cent. of the gross transportation receipts for the 11 months.

This appropriation, of course, is exceptional, but in 1901 Southern Pacific betterment expenditure paid for out of current income was $6,871,000; and the total of these expenditures in that and the three years preceding was $14,371,000. With the reported expenditures of the 11 months of 1902, these betterment charges are brought up to $25,321,000; so that in these five years the Southern Pacific has expended a sum equal to 12½ per cent. on its present outstanding stock for this work, exclusive of the increased expenditures on the property charged directly into operating expenses. Maintenance charges in 1901 accounted for practically half of the reported total increase in operating expenses and amounted to about 25 per cent. of the gross receipts and to $1,176 per mile of road for cost of maintenance of way and to $902 per mile for maintenance of equipment—sums in excess, both relatively to gross receipts and to expenditures per mile, of the maintenance expenditures of the other trans-continental systems competing with the Southern Pacific.

With this record of $25,000,000 appropriated out of surplus income during the last five years for improvements and new equipment, the Southern Pacific directors may now legitimately propose to raise $25,000,000 in new capital for further prosecuting this work, if they think so much additional expenditure is necessary in addition to the amounts which will undoubtedly still be charged out of current income. This $50,000,000 of funds spent by the Southern Pacific in improving and adding to its property ought to go a long way toward placing it in as good condition for economical operation as those roads with which it competes, if not better. There is of course a good deal of work still to be done in this direction on the 9,017 miles of railroad which the company operated during 1901. According to the Southern Pacific's annual report for 1901, less than 25 per cent. of the company's main and second track is laid with rails weighing 75 lbs. to the yard or over, or only 2,190 miles out of 8,858 miles. About 2,390 miles, or 27 per cent. of the total mileage, is laid with rails of 50 lbs. or less; and practically all of this must be replaced by rails of heavier section, even allowing for the fact that much of Southern Pacific's mileage is branch line or divisions of light earning capacity upon which it would not be profitable to spend much.

A large share of the improvement expenses of the last two years—$3,897,000 in 1901 and over $1,000,000 in 1900—has been for new equipment, and in addition there have been very heavy charges directly into operating expenses for renewing old equipment. Even these large expenditures, however, leave the company with much old, light capacity and unprofitable equipment which must be replaced. This is shown by certain figures in the annual report. Thus an inventory in June, 1901, showed the locomotives to have been in service an average of 14 years; passenger train equipment had been in service an average of 16½ years, and freight cars an average of 10 years. Another division of this inventory shows that nearly 27 per cent. of the locomotives, nearly 52 per cent. of the passenger equipment, and 24 per cent. of the freight equipment had been acquired previous to 1885, so that replacements of rolling stock will absorb heavy amounts of Southern Pacific funds, irrespective of purchases of additional equipment called for by an increasing traffic.

Stories about Mr. Holden's new decapod suburban engines for the Great Eastern Railway continue to drift across the Atlantic, but so far we have seen nothing official; indeed we have been informed that it was quite against Mr. Holden's wish that this experimental locomotive should have been made public until the experiment had been a little more thrashed out. We suppose that the Great Eastern does the heaviest suburban business of any railroad having a terminal station in London, which means, probably, that it does the heaviest suburban business of any railroad in the world, although now we are guessing. It seems probable that the passengers handled in and out of the Liverpool Street station must now number something like fifty million a year; at any rate, even if our guess is considerably out of the way, the Great Eastern does a prodigious suburban business and, obviously, its responsible officers want to find the most efficient suburban engine. From the notes that we have heretofore published, the reader will have learned that this latest engine has ten driving wheels coupled, all of the weight of engine and water tanks being carried on these drivers. It has three cylinders, two outside and one inside. The cylinders are 18½ in. diameter by 24 in. stroke; the driving wheels are 54 in. diameter; the total weight on drivers, with 2,000 gals. of water in the tanks and 3½ tons of coal, will be something over 60 long tons. It is said that the purpose is to accelerate from rest to 30 miles an hour in 30 seconds. The maximum tractive effort of this engine would be from the figures above about 33,600 lbs. Whether or not this engine could lift a train of 15 coaches up to 30 miles an hour, in 30 seconds, is, to say the least, a little doubtful. We have no information as to the maximum speed that these trains must reach, but presumably the notion is to make time rather by quick acceleration than by high maximum speed, for with 54 in. drivers 60 miles an hour means a good many revolutions.

A great philosopher discovered that the obstacles to human progress are friction, gravity and natural depravity. Every year we see a multitude of inventions to do away with these obstacles, and friction is oftener attacked by the inventor of a ball bearing or a roller bearing than any other way. We learn now from an esteemed contemporary that a young gentleman in the Mississippi valley has invented a ball bearing for car axles, which will "reduce the frictional resistance 1,500 per cent." Mr. Forney entertains his friends sometimes by assembling in one locomotive the various schemes for saving fuel. By adding the percentages saved, he produces a locomotive which will make coal to sell and will be more valuable than a coal mine; but we have never before come across any invention quite so productive as this ball bearing. Nothing now remains but gravity and natural depravity.

NEW PUBLICATIONS.

Our Empire's Trains, published by the Locomotive Publishing Co., 102 Charing Cross Road, London, W. C. One shilling.

This is the summer number of the *Locomotive Magazine* in honor of the coronation and shows several plates of English, Indian, Australian and Canadian trains. The supplements, two in number and colored, represent the engine, an old single, used in 1863 to take the wedding train of the then Prince of Wales to Sandringham and the second one of the fine engines recently designed by Mr. Holden, and built by the Great Eastern and shown at the Exposition in Paris in 1900.

TRADE CATALOGUES.

Compound Locomotives (Goëlsdorf system) Alex. Friedman, 44 Rue Bouret, Paris.

M. Friedman has just brought out an interesting catalogue of the Goëlsdorf compounds in use all over the world. It is printed only in French and German, but its value consists largely in the plates of engines and the short specifications. There are 36 different engines illustrated besides the frontispiece, which is a very fine engraving of the largest Atlantic type engine in Europe. The pamphlet can be procured from Mr. F. Moore, 102 Charing Cross Road, London, W. C.

Blowers is the title of a 42 page catalogue just issued by the American Blower Company, Detroit, Mich. Descriptions and illustrations of their pressure and volume blowers together with about 10 pages of usual miscellaneous tables are given.

The H. W. Johns-Manville Company, New York, have issued their 1902 catalogue of electrical supplies. This new edition has 108 pages, profusely illustrated, and contains a number of new articles such as double trolley suspensions, etc. A complete table of contents and an alphabetical index are given.

Foundation Brake Gear.*

In March and April, 1900, I attended a series of tests made by the Mechanical Engineering Department of the University of Illinois, under the supervision of Professor L. P. Breckenridge, on the strains to which brake-gear is subjected in service. These tests were made with a train of five or six freight cars and under conditions as near as possible to those occurring in ordinary yard switching, where most of the damage is done to our equipment.

The car was a box car just out of the shops, weighing 34,000 lbs., with a total estimated braking power of 22,000 lbs., or 64.7 per cent. of its light weight, and was loaded with 70,000 lbs. of scrap iron, making a gross load of 104,000 lbs. or 26,000 lbs. per pair of wheels. The car was equipped with the ordinary Westinghouse quick-action brake and metal brake-beams, outside hung, and soft cast-iron brake-shoes.

To accurately measure the different pressures, a gage was applied to the brake cylinder and a dynamometer brake-beam substituted for the rear beam on the car. These gages were carefully tested before and after the tests and the readings corrected. As the wheels and brake-shoes were new, the brakes were set and the car run over a sanded track until the shoes were worn down to a fairly good fit on the tread of the wheels, thus giving the maximum amount of friction.

The first series of tests were made to determine the friction in the foundation gear, and show the pressures indicated on the brake-beam gage for the different reductions in train pipe pressure. For instance, a reduction of 5 lbs. in train pipe showed 9 lbs. in brake cylinder and only 200 lbs. on brake-beam, while the estimated pressure on the beam was 828 lbs., or a loss of 76 per cent. A reduction of 10 lbs. showed 21 lbs. cylinder, and 950 lbs. brake-beam pressure, against an estimated pressure of 1,931 lbs., or a loss of 50.8 per cent. A 15 lb. reduction gave 29 lbs. cylinder and 1,600 lbs. brake-beam pressure against 2,667 lbs. estimated, or 40 per cent. loss. On the emergency application this percentage of loss was reduced to an average of about 31 per cent. due to the sudden shock when the brakes were set.

These tests were made with the car standing, but it was noted when the car was moved in either direction that the loss was reduced; the average amounting to from 10 to 20 per cent. of what might be called permanent friction, verifying the figures made by Mr. Marshall in his paper on this subject before the Western Railway Club, April, 1894, and proving that we are losing a large percentage of our estimated braking power, although it is a question whether we can increase it without skidding the wheels.

But the most interesting points developed by these tests was the increased pressure on brake gear, caused by the brake-shoes riding upon the tread of the wheels when the brake was applied and the car moved. In several cases when the brake was applied by hand, the brakeman using a short club to increase his leverage on the brake wheel, the same as in use in all freight yards, a force was developed by moving the car, amounting to from 50 to 115 per cent. above the initial pressure on the beams, and in several instances damaging the brake gear to such an extent as to make it inoperative, proving that many of the broken parts of brake gear are due to this cause, and are brought about in the same manner while making up trains.

A car is set on the siding and the brake is set up as hard as possible with the aid of a club; cars are then kicked on the siding and coupled up in train, the first car being depended on to hold the train. Every time this car receives a blow sufficient to move it, the brake-shoes on the back pairs of wheels ride up from 1 in. to 2 in. with the result of an increase over the initial pressure of from 20 to 120 per cent., and if the initial pressure is from 9,000 to 10,000 lbs. per beam, which is easily

*A paper by Mr. H. M. Perry, Master Car Builder of the Algoma Central & Hudson Bay Ry. Presented at the Convention of the Master Car Builders' Association.

made by a strong man, you can readily see the result; a maximum pressure of 15,000 to 20,000 lbs. per beam or more than double what they are designed to stand.

I might say that this force is only developed under certain conditions, although these conditions are liable to occur at any time. A heavily loaded car, a maximum amount of friction between wheels and shoes, a slack brake hanger and power enough to move the car with the brakes applied to the limit and we have the necessary conditions to destroy some part of the brake gear. I might say that this power was great enough in one instance to tear the brake hanger eye down from the sill, and in another to break a 1 in. hanger in the straight section of the bar; the fracture showing a clean break in good tough iron.

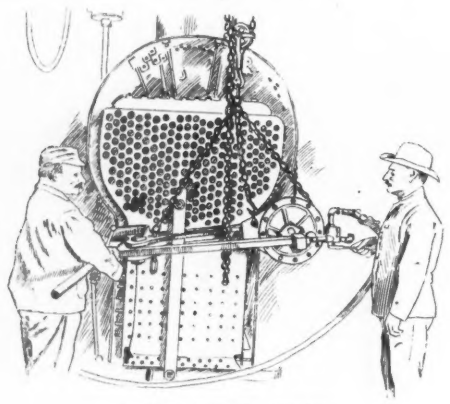
Regarding the slack in brake hangers, I found that in all the cars in the trains, on which the tests were made, the brakes on the rear wheels would rise up from 1½ to 2 in., whenever the cars were moved ahead with the brakes set, although they could not be lifted over ½ in. before the brakes were set. This was accounted for by the brakes being hung to the car body, so that when the brakes were set the tendency was to lift the car on the springs, notwithstanding the forward brakes were drawing down at the same time.

Under these conditions it will be noted that this force is brought into action at every application of the brakes, but at a greater or less degree, owing to existing conditions.

When an application is made by air, we find an increase of from 1,000 to 1,500 lbs. per. beam when the piston is pushed back in the cylinder; but when the brake is applied by hand so as to lock the levers in position, the excess pressure will be anywhere from 25 to 120 per cent. over the initial pressure on the brakes. Is it surprising that brake attachments are damaged at this time?

Pneumatic Staybolt Appliances.

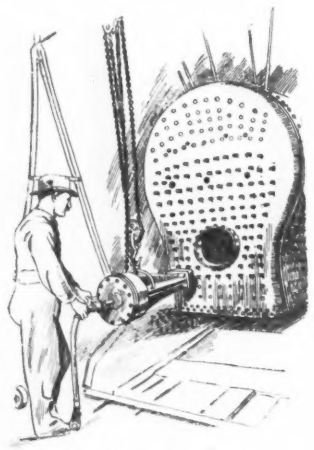
A simple device, yet a labor-saver, is the staybolt breaker shown in the accompanying illustration and made by the Baird Portable Machine Co., Topeka, Kan. Designed to cut out old fire-boxes, it can be operated by one man, with a boy assistant to handle the valves, and



Baird Staybolt Breaker.

is capable of cutting out the largest size fire-box in 10 hours. It is claimed that an average saving of $18 a day can be made by the use of one of these staybolt breakers. In using the tool, the makers consider the more economical way is first to separate the fire-box from the forward part of the boiler; although if it is desired to remove the fire-box by taking out the door sheet and back head, no difficulty will be experienced in operating the machine. It weighs but 800 lbs.

The staybolt cutter, an illustration of which is also

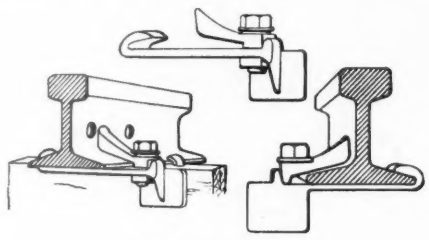


Baird Staybolt Cutter.

shown, was designed for cutting off the ends of staybolts after they have been screwed into place in the fire-box. The machine is a cylinder and frame combined, the cylinder diameter being 15 in., and may be operated either by steam or compressed air, preferably the latter. With a working pressure of 100 lbs. it will cut off staybolts up to 1⅛ in. in diameter, at the rate of 1,200 per hour, and at a proper distance from the sheet to allow for heading over. Use of this tool prevents loosening the bolts in the plates, as frequently occurs where a hammer and chisel are used. The weight of the appliance is 450 lbs. and one man can handle it. A larger machine, the No. 2, is similar in design, and will cut off bolts up to 1¼ in. diameter.

Laas's Anti-Creeper.

A common method of keeping rails from creeping is to bolt short sections of angle bars to the rails. This has some bad features. The attachment cannot be made at any new place without drilling, and, secondly, it is not desirable to have to drill holes in the rails. The device of Mr. Laas shown by the engraving, is simple, consisting merely of a plate hooked over the rail flange



Laas's Anti-Creeper.

on one side and, formed into a depending lug about 2½ in. deep on the outside of the rail. It is secured by a dog bolted to the lower plate and extending to the web of the rails. The greater the tendency of the rail to move, the greater will be the clamping effect of the dog, his bite, in short. It is known that rails do not creep at the same rate on both sides of the track even if anti-creepers are put on, and in time one of the rails is ahead of the other. This is especially true on curves. In order to square the ties it becomes necessary to remove the anti-creeper. This is easily done with the device here illustrated.

It is stated that with these devices it is even possible to work the rails back into place. On a cool morning some of the anti-creepers will stand away from the ties perhaps ¼ to ½ in. and by setting them up tight against the ties it will be found that the expansion, due to the heat of the day, will move the rails back into place.

The Pennsylvania Railroad is making tests of this device. Other important roads that are giving it a trial are the New York Central, the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Illinois Central and the Pittsburgh & Lake Erie. The originator of the device is Mr. Edward Laas, Superintendent of Construction on the Chicago, Milwaukee & St. Paul.

The South African Railroads.

Though the difficulties of carrying on the work of the railroads during the war were enormous, with peace have come even greater problems. Although Sir Percy Girouard has doubled the old Netherlands stock, has greatly increased the number of engines, and is importing some of the most powerful machines ever run on the 3 ft. 6 in. gage, he is still in need of more rolling stock, especially passenger stock.

Throughout South Africa the gradients are very steep, necessitating heavy engines. Natal, in order to meet the difficulty, has laid 80 lb. rails throughout her system. Sir Percy Girouard intends doing the same gradually throughout his system, using the old 60 lb. rails for extensions.

One of the chief improvements made has been the amalgamation of the Transvaal and Orange River Colony Railroads. This permits the carrying out of a greater scheme of extension, which might otherwise have been prevented by the rivalry of the two systems.

One burning question, however, is that several extensions will obviously be necessary in order fully to develop the country. A line from Springfontein to Kimberley will bring the latter town nearly 100 miles nearer the sea. By the connection of Klerksdorp and Fourteen Streams the distance between the two great industrial centers of Kimberley and Johannesburg will be reduced by 200 miles.

But all proposals of such a nature, though evidently for the public good, are bound to remain in abeyance until some sort of concerted action is possible between the Cape and Natal, the rivals for the carrying trade of Johannesburg, and the majority of the Transvaal inhabitants, who regard Delagoa Bay as the natural port of the country. At the present moment both colonies are straining every nerve to secure the Johannesburg transport trade. The Cape suffers under the disability of having the greatest mileage, while the Natal and Delagoa lines are seriously handicapped by high gradients. The average train load from the Cape is 500 tons, from Natal 380 tons, from Delagoa 440 tons. From this it is apparent that the Cape is less handicapped by distance than would appear from a glance at the map.

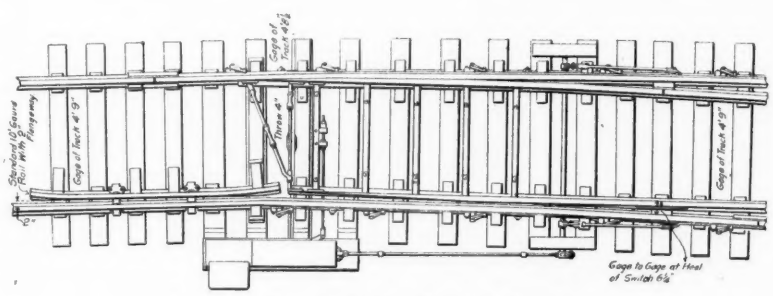
On every scheme of extension is brought to bear, not a desire for the general development of the whole country, but the local rivalry of States anxious for their own revenue. It becomes obvious, therefore, that the railroad amalgamation of the South African States is necessary before any great or far-reaching scheme of railroad development can be adopted. The Cape naturally would object to the linking of Springfontein and Kimberley, as this would divert through the Orange River Colony a good proportion of its traffic. The Central Railway would be disinclined to see Klerksdorp and Fourteen Streams connected, since much of the Cape traffic running from Johannesburg to the Orange River Colony would be captured by the Cape Railway. Rhodesia would disapprove of the extension of the Pietersburg line to Tuli and Salisbury, as it might lose a great part of the through traffic north of Mafeking. The Transvaal, possessing a great gold industry, might divert all through traffic to Delagoa Bay, Natal, or the Cape, as it pleased. It might at any time be in the interests of the Transvaal Colony to adopt any of these courses. This would result in an outcry throughout South Africa. Yet, as long as the four great railroad systems remain distinct and rivals, such a course is always possible.

The Zululand Railway, extending from the Lower Tugela for a distance of 53 miles in the direction of the St. Lucia coal fields, has been opened for traffic.—*Johannesburg letter to the Times.*

Lap Point Switch—Boston Terminal Company.

A novel arrangement of switch points is shown by the accompanying engraving, and is being successfully used on the curved tracks leading to and from the trainshed of the Boston Terminal Company. It is stated that one set that has been in use for a year shows no wear.

The switch is a regular 15 ft. standard point switch as used by the New York, New Haven & Hartford, except that a 17-ft. point, planed to an angle of 1 in 38, is used in place of the 15 ft. point on the outside of the



Lap Point Switch—Boston Terminal Company.

curve. A standard guard rail is placed in front of the shorter point, and prevents the wheels of the passing cars from giving the long point a heavy blow and consequent hard wear.

The gage from stock rail to the forward end of the 17 ft. point measures 4 ft. 8½ in. and 4 ft. 9 in. at a point 7 ft. 6 in. back; the balance of the curved portion of the tracks having a radius of about 570 ft., is gaged 4 ft. 9 in. A diagonal brace with turnbuckle adjustment connects with the forward bridle rod and holds the lap point securely in position.

The idea originated with Mr. H. Steele, Track Master for the above road.

Foreign Railroad Notes.

A press despatch says that in order to insure immediate aid to persons injured in wrecks the Prussian State railroad administration has decided to maintain ambulance cars at principal stations throughout the country. The cars will contain full hospital equipment, including operating tables, beds and everything necessary to render aid. Each car will be in charge of a medical officer, and all the employes will be trained in first aid to the injured.

TECHNICAL

Manufacturing and Business.

The Curtain Supply Co., Chicago, has opened an office in New York City, at 2131 Park Row Building. A. L. Whipple will be in charge.

Geo. C. Murray, Western Manager of the Sterlingworth Railway Supply Co., with headquarters at Chicago, has been promoted to be Manager of Sales, at 1113 North American Building, Philadelphia, Pa. He is succeeded in the Chicago office by M. P. Kelly.

Parke, Davis & Co., Detroit, Mich., manufacturers of drugs and chemicals, are making extensive improvements and additions to their electrical, steam and power plant, the work being done under the direction of George W. Scott, Consulting Engineer, The Rookery, Chicago.

It is announced that Mr. James W. Cooke has resigned from service with the American Locomotive Co., to take effect Sept. 1. He has been engaged at the Paterson shops. Mr. Cooke has taken a position with Mr. James W. Ferguson, a building contractor in large busi-

ness. He will be succeeded at Paterson by Mr. Archibald Inglis, now at Schenectady, who was formerly with the Rogers Locomotive Co. at Paterson.

The Continental Railway Supply Co. has just been organized to handle railroad supplies and appliances of all kinds. Their offices are in the Old Colony Building, Chicago. J. D. Hurley, formerly Vice-President and General Manager of the Standard Pneumatic Tool Co., is President of the Continental Co., and A. B. Holmes, formerly Assistant Manager of the Standard Pneumatic Tool Co., is Secretary and Treasurer of the new company.

Westinghouse, Church, Kerr & Company announce the removal of their New York office from the Havemeyer Building, 26 Cortlandt street, New York City, to the Maritime Building, Nos. 8 to 10 Bridge street, opposite new Custom House and near Bowling Green. The change is the result of a largely increased business. Three floors, the first, second and third, will be devoted to their uses. The new quarters will afford about double the floor space available in their present location.

The exhibition of ship riveting which the Chicago Pneumatic Tool Co. is making at Glasgow, Scotland, is meeting with satisfactory success. Mr. E. Guennell, formerly Superintendent of the Chicago Shipbuilding Co., South Chicago, is in charge of this work, and he reports great interest on the part of the Clyde shipbuilders. Two expert riveters from the Chicago ship yards were sent to Glasgow to assist in this work. Mr. F. D. Johnson, Manager of the New York office of the Chicago Pneumatic Tool Co., has been sent to Europe to push the company's interests there, and Mr. Geo. H. Hayes has been sent over to take charge of the mechanical work in the London works.

Iron and Steel.

The Wabash Bridge Co., Wabash, Ind., has increased its capital to $100,000.

During the week some large railroads have increased their orders for rails for 1903, both from home and abroad.

F. J. Hearn, President of the National Tube Co., has resigned, and William B. Schiller, First Vice-President, has been elected to succeed him.

The Cambria Steel Co. has bought the ore mines of the Republic Iron & Steel Co. in Michigan, and the ore will hereafter be shipped direct to Johnstown, Pa.

Wilson-Lyon & Co., San Francisco, dealers in rails and railroad material, have 10,000 tons of rails in transit for construction of electric railroads on the Pacific Coast.

The Pressed Steel Mfg. Co., with a capital of $200,000, has been organized at Atco, N. J., by G. L. Bettew, John Q. Adams and others, to make steel ball bearings and other light material.

John Henry, of Carnegie, Pa., President of the Chartiers Iron & Steel Co. before its absorption of the American Sheet Steel Co., died in Pittsburgh Aug. 16 as the result of being hit by a railroad train.

The Nova Scotia Steel & Coal Co. has decided to issue $1,910,000 common stock, $1,030,000 of which will be offered immediately to the holders of common stock on record Aug. 20. The proceeds of the new issue will be used for further enlargements of the plant.

The keel has been laid for the second of the big steel car floats that the Fore River Ship & Engine Company is building at its yard on Quincy Point, Boston Harbor, for the New York, New Haven & Hartford Railroad, and the first frames are already up. The other float is now well under way. These barges are of unusual size, each having three tracks with room to hold 23 50-ton cars at one time.

The Fort Pitt Engineering & Construction Co. of Pittsburgh, recently organized, has applied for a charter, with $50,000 capital. The object of the company is to act as consulting, contracting and constructing engineers, giving especial attention to machinery and plant for the economical production of iron and steel. W. S. Haugh is President and Treasurer; J. T. Rowley, who owns a number of patents on rolling mill machinery, etc., is Vice-President, and John A. Hellstrom, Chief Engineer.

James M. Clark, Chief of the Bureau of Industrial Statistics of Pennsylvania, is about to issue his report on the production of iron and steel in that State. According to the preliminary statement for the year 1901, that State made 7,364,295 gross tons of pig iron, an increase over the previous year of 992,607 tons. The capital invested to bring about this production was $152,075,575, or three times the capital invested in the active plants five years ago. The steel production in 1901 was as follows: Bessemer, 4,319,144 gross tons; open-hearth, 3,555,828; crucible and other processes, 85,748, making a total production of steel in the State of 7,959,720 gross tons, an increase in the total production over 1900 of 1,702,945 tons. Allegheny County produced nearly 65 per cent. of the entire production of steel in the State, and over 80 per cent. of the production came from the counties west of the Allegheny mountains.

The Pintsch Plant in Nashville.

The Pintsch Compressing Company has perfected its plans for a Pintsch plant in Nashville, Tenn. The gas works apparatus is now being shipped to that point and work on the building will be pushed as much as possible. When this works is finished the South will be pretty well dotted with Pintsch gas plants. Nashville will bring the total number of Pintsch gas works up to 63 and will make the tenth plant that has been built within a year. The growth of the Pintsch business has been very fast, and in no year has greater progress been made than in the twelve months dating from July, 1901, to the present time.

Baltimore & Ohio Car Shops.

The general manager of the Baltimore & Ohio is said to have approved plans for addition to the car repair shops at Connellsville and Glenwood and the construction of a new shop at New Castle Junction.

Hall Signals in England.

The North Eastern Railway of England has awarded to the Hall Signal Co., of New York and Chicago, a contract for the equipment of 10½ miles of its line with automatic block signals. The line to be equipped lies between Alne and Thirsk. It is double-track and is a part of the important 80-mile section between Lancaster and York. The signals will be semaphores and they will stand normally in the "danger" position, worked by motors. There will be a home and a distant signal at each post. There are, of course, a large number of interlocking plants on this part of the road; the signals at these plants will be controlled by the electro-magnets of the track circuits and also from the cabin; and all outlying switches will be provided with complete electric locking.

The Corrugated Fire-box in England.

The corrugated fire-box has been introduced into England on the Lancashire & Yorkshire Ry. on one of the new eight-coupled goods engines. It seems from a photograph to be very much like the Vanderbilt boiler in outward appearance.

The Commonwealth Steel Company.

The progress of the Commonwealth Steel Company's new plant at Granite City, Ill., described in our issue of July 25, continues and matters are rapidly being got in shape for beginning operation on Sept. 1. The three basic open-hearth furnaces, which are a type thought to be entirely new to this country, will be prepared to turn out steel for truck castings for 150 cars per day, announcement of which is made by the company elsewhere in this issue. We have already mentioned the fact that by completing this plant for beginning business on Sept. 1, an unusual feat has been performed, the entire time occupied in its erection being but six months, the contract having been let on Feb. 22.

Car Lighting.

A new burner has been perfected by the Safety Car Heating & Lighting Co. called the hexagon tip. Through its use the illumination afforded by a standard Pintsch lamp can be increased by about 40 per cent., while the additional consumption of gas amounts to something less than 10 per cent. The tip is applicable to any standard 4-flame Pintsch lamp (of which there are 140,000 in use) and it is fair to suppose that the railroads will introduce this new tip as fast as it becomes necessary to replace the ones now in service. One large railroad system in the east has already had many of its lamps fitted with the new burners, and all tips hereafter ordered by that company will be of the new type. The catalogue number of the new fitting is No. 222a.

THE SCRAP HEAP.

Notes.

On Wednesday, August 13, the Pittsburgh & Lake Erie moved through its large yards at McKee's Rocks, 5,857 loaded freight cars, far beyond any previous day's movement.

Dispatches from Cape Town announce the arrival there recently of the first so-called "train de luxe" from Buluwayo. The journey is said to have been made in 74 hours; the distance is about 1,360 miles.

The Pere Marquette Railway has built a telegraph line between its offices on the east and west shores of Lake Michigan, the line running through Milwaukee, Chicago, and around the southern end of the lake.

On Wednesday, Aug. 13, the eastbound 20-hour train of the Pennsylvania was run from Crestline to Pittsburgh, 188.8 miles, in 192 minutes. On some portions of the road the speed reached 78 miles an hour.

On the same day the 20-hour train of the Lake Shore was run Kendallville, Ind., to Toledo, 91 miles, in 75 minutes, equal to 72.8 miles an hour. From Elkhart to Toledo, 134 miles, the time was 117 minutes, equal to 68.7 miles an hour.

Philadelphia papers say that the Reading road is allowing ten days vacation, with pay, to all conductors who have been in the employ of the company for five years or more. It is said that this order affects 350 conductors.

The Boston & Maine now requires each season ticket to bear the photograph of the person to whom it is sold. The photograph is 2 in. x 2 in. and the passenger's complexion and stature are noted in print below. A circle is punctured around the margin of the photograph, to provide against fraud.

The Chicago & North Western opened a new line from Evan to Marshall, Minn., via Wabasso, on the 13th inst. This line is 47.14 miles long from Evan Junction (on the present Sleepy Eye & Redwood Falls line), or 54.48 miles from Sleepy Eye. One passenger train each way a day will be run, making connections with Chicago trains.

The Norfolk & Western is to provide emergency boxes and medicine chests on all of its trains, both passenger and freight, and the trainmen will be instructed in "first aid to the injured." A Chicago despatch says that similar instruction is to be given on the Chicago & North Western.

On a train of the Seaboard Air Line, in North Carolina, last Tuesday, Fred Stever, roadmaster, and the colored porter of the train were shot and killed, while going to the defense of the conductor, who had been attacked by four negroes whom he had ordered out of the white passengers' car.

Traffic Notes.

A Pennsylvania paper says that the number of emigrants carried westward by the Pennsylvania Railroad since the first of last April has averaged 400 a day.

The Trunk lines and the Central Traffic Association have agreed to revise all tariffs so as to make the minimum carload of iron and steel products 20 tons; hitherto it has been 15 tons.

On August 14 an excursion from Pittsburgh and from points west of that city, to Atlantic City, N. J., over the Baltimore & Ohio, filled 12 trains; and these included 17 parlor and 30 sleeping cars.

The Central of New Jersey announces a new through freight line between New York and Pittsburgh. The route is over the Philadelphia & Reading, the Beech Creek (New York Central) and the Buffalo, Rochester & Pittsburgh, the junction points being Tamaqua, Newberry Junction and Clearfield.

The Corporation Commission of North Carolina has ordered the reduction of the passenger rates on the branch lines of the Southern Railway in that State to 3.25 cents a mile first-class, and 2.75 cents second class. On certain other lines of the company the order reduces the fares from 3.5 cents to 3 cents.

A press despatch from Savannah, Ga., reports marked satisfaction in that region over the abolition of through all-rail freight rates on cotton to New England cities. It is expected that this increase in the cost of railroad transportation will lead to the shipment of a larger proportion of the cotton for New England by vessels from South Atlantic ports.

President James J. Hill, of the Great Northern, announces that he has ordered reductions in grain rates on the Pacific coast, which will save to the producers over $2,225,000. This estimate is doubtless based on the traffic over all of the railroads, not that of the Great Northern alone. The reductions are one and two cents a bushel on wheat, and similar percentages on merchandise. Mr. Hill says that reductions will also be made in Minnesota and North Dakota on wheat to the large markets; these reductions will be from ½ cent to 1.5 cents a bushel.

Texas papers report an exciting passenger rate war in that State, round trip tickets to Chicago being sold at 30 cents; to St. Louis 20 cents, and to Kansas City 10 cents. One ticket broker offered a five dollar box of cigars with each ticket. It is not clear from the accounts what roads bear the loss. The regular one-way fare from Galveston to St. Louis is $25.10, and to Chicago $31.40. The rate cutting is said to have begun at Dallas, the rivals being the St. Louis Southwestern and the Texas & Pacific. On August 15, the lowest round trip rate from Houston was $18.00, but the next day the cutting became reckless and rival brokers made successive reductions of $4.00, $8.00, etc. On the 16th, 500 tickets were sold to Chicago. The war extended to Galveston and the Missouri, Kansas & Texas, the International & Great Northern, the St. Louis Southwestern and the Atchison, Topeka & Santa Fe appear to have taken part in the contest.

Through Tonnage Out of New York.

The *Wall Street Journal* has the following comparative table of through tonnage carried out of New York for points more than 400 miles distant by the nine roads, during the week ending July 31. It discloses the rather remarkable fact that Erie disputes with Pennsylvania the second place in the list, with Lehigh Valley fourth. The most surprising showing is that of Lackawanna, the third anthracite road, which, though a short Buffalo route, apparently secured that week only from 4 per cent. to 9 per cent. of total tonnage out of New York.

	July 25.	Per	July 26.	Per	July 28.	Per
	Tons.	cent.	Tons.	cent.	Tons.	cent.
New York Central..	1,336	24.8	1,556	25.9	649	16.1
Erie	1,129	20.9	916	15.3	777	19.3
Pennsylvania	972	18.0	827	13.8	1,007	25.0
Baltimore & Ohio...	280	5.2	502	8.4	308	7.6
West Shore	551	9.6	536	9.0	228	5.7
D., L. & W.....	283	5.3	342	5.7	383	9.5
Lehigh Valley	605	11.2	696	11.6	554	13.7
N. Y., O. & W.....	180	3.3	577	9.6	24	0.6
C. R. R. of N. J....	94	1.7	40	0.7	101	2.5
	July 29.	Per	July 30.	Per	July 31.	Per
	Tons.	cent.	Tons.	cent.	Tons.	cent.
New York Central...	1,395	24.5	1,381	24.5	1,392	22.4
Erie	1,105	20.3	1,096	19.4	1,078	17.4
Pennsylvania	1,045	19.2	1,285	22.8	1,008	16.2
Baltimore & Ohio....	476	8.8	360	6.4	651	10.5
West Shore	306	5.6	374	6.6	380	6.1
D., L. & W.....	337	6.2	480	8.5	259	4.2
Lehigh Valley	453	8.3	489	8.7	1,058	17.1
N. Y., O. & W.....	277	5.1	107	1.9	266	4.3
C. R. R. of N. J....	46	0.8	68	1.2	114	1.9

Expenditures by the Norfolk & Western.

It is said officially that the Norfolk & Western will make heavy appropriations from earnings for betterment and equipment and that this expenditure will begin the next six months. It is believed, in fact, that over $1,000,000 will be spent by the Norfolk & Western on equipment within six months.

Another Visit from the North Eastern.

In our last issue the announcement was made that the directors of the North Eastern Railway Company were arranging for a number of their principal officers to pay another tour of inspection to the United States. Although not yet definitely decided, it is believed that the party will leave Liverpool during the second or third week in September, and will be away from England for nearly five weeks. It will probably be composed of Mr. Philip Burtt (chief traffic manager), Mr. V. L. Raven (chief assistant mechanical engineer, Gateshead), Mr. W. J. Cudworth (engineer, York), Mr. J. B. Harper (divisional superintendent, York), and Mr. T. Pickering (divisional superintendent, Newcastle-on-Tyne). It is uncertain whether Mr. Gibb will be able to accompany the party, but should he be prevented from so doing,

his place will, it is stated, be taken by Mr. Alexander Wilson, his chief assistant.—*Railway News.*

These gentlemen do not need to be reminded that they will have a warm welcome if they do come.

The Wabash in Pittsburgh.

Mr. Ramsey, President of the Wabash, is quoted as having said that there will be large Gould terminal properties and local lines ready for operation in Pittsburgh some time next spring. The Wabash will have adequate terminals on the south side of the city, along the Monongahela River, being a strip of river property about 1,200 ft. long. While this is out of the city proper, it is a neighborhood which will be the manufacturing center before many years. He says further, that the facilities of the company will handle 2,000 cars of freight a day, and he does not think that the total expense of establishing the Wabash in Pittsburgh will exceed $10,000,000. Not a dollar of this, however, comes out of the Wabash funds.

LOCOMOTIVE BUILDING.

The Union Pacific has ordered 120 locomotives from the Baldwin Works.

The Baltimore & Ohio is having two locomotives built at the Baldwin Works.

The Seaboard Air Line is reported to be in the market for about 35 locomotives.

The Northern Pacific has ordered 50 locomotives from the American Locomotive Co.

The American Steel & Wire Co. is having a locomotive built at the Baldwin Works.

The Oregon Short Line has, it is said, ordered 15 compound consolidation engines from the Baldwin Works.

The Tennessee Central has ordered 12 locomotives for March and April, 1903, delivery from the American Locomotive Co.

The Lake Shore & Michigan Southern has ordered 45 freight locomotives from the Brooks Works of the American Locomotive Co.

The Chesapeake & Ohio has leased from Edward T. Stotesbury, of Philadelphia, 25 wide fire-box locomotives, in addition to the cars reported elsewhere.

The Wisconsin Central order for six locomotives with the Brooks Works, reported in our issue of Aug. 8, will be duplicates of the 10 simple Chautauqua locomotives ordered last winter and referred to in our issue of March 14.

The Pennsylvania is having 46 freight locomotives for the lines east of Pittsburgh built at the Baldwin Works. This concludes the order with the Baldwins for 195 locomotives to be used for this service, reported in our issue of Dec. 6, 1901.

The Colorado & Southern has ordered 12 consolidation and three 10-wheel passenger locomotives from the American Locomotive Co. for April and May, 1903, delivery. The consolidation engines will weigh 195,000 lbs., with 175,000 lbs. on the drivers, and have 16 and 28 x 32 in. cylinders, 57 in. drivers and extended wagon top boilers, with a working steam pressure of 210 lbs., 355 charcoal iron tubes, 2 in. in diameter, 15 ft. long, with fire-boxes 101 in. long and 71 in. wide, tender capacity 8,000 gallons of water and 11 tons of coal. The passenger engines will weigh 169,000 lbs., with 130,000 lbs. on the drivers, and have 20 x 28 in. cylinders, 67 in. drivers and extended wagon top boilers, with a working steam pressure of 210 lbs., 372 charcoal iron tubes, 2 in. in diameter, 14 ft. 10 in. long, with fire-boxes 120 in. long and 41 in. wide, tender capacity 6,000 gallons of water and 10 tons of coal. The special equipment for both classes includes: Westinghouse air-brakes, steel axles, Tower couplers, Monitor improved injectors, Jerome piston and valve rod packings, Leach sanding devices, Nathan sight-feed lubricators, French springs, Midvale driving wheel tires, Paige spoke truck and tender wheels and 60 in. steel wheel centers.

CAR BUILDING.

The Southern is reported to be in the market for 1,000 steel cars.

The Northern Pacific is having five coaches built at the Barney & Smith works.

The Pennsylvania is having 1,000 freights built at the Pressed Steel Works, Allegheny.

The Buffalo & Susquehanna has ordered 200 gondola cars for January, 1903, delivery.

The Oregon Short Line, according to press reports, has ordered 600 stock and gondola cars.

The Atchison, Topeka & Santa Fe has ordered 200 flat cars from the American Car & Foundry Co.

The Norfolk & Western will, it is said, spend $1,000,000 or more on equipment in the near future.

The Toledo Terminal is having 50 freights built at the W. Detroit works of the American Car & Foundry Co.

The Detroit Southern has ordered 600 coal cars of 80,000 lbs. capacity from the Structural Steel Car Co.

The Pennsylvania is reported to have ordered 14,000 coal, coke and ore cars from the Pressed Steel Car Co.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 300 box cars from the American Car & Foundry Co.

The American Car & Foundry Co. has miscellaneous orders for 19 coaches, eight logging cars and two tank cars.

The Canadian Northern has ordered 200 box cars of 60,000 lbs. capacity from the Western Steel Car & Foundry Co.

The Tennessee Lumber Co. is having four freights built at the Huntington Works of the American Car & Foundry Co.

The Norfolk & Western is building 800 hopper bottom coal cars at its Roanoke shops. These cars will have steel underframes and Barber trucks.

The Lehigh Valley is reported to have ordered 10 coaches from the Pullman Company, and eight milk cars from the American Car & Foundry Co.

The Atchison, Topeka & Santa Fe is currently reported to have ordered from the Pullman Company 50 cars for passenger equipment, for use on the California limited trains.

The Toledo Railway & Terminal Construction Co. has ordered from the Rodger Ballast Car Co. 50 convertible ballast cars with center and side dump; also one standard double plow distributing car for October delivery.

The Richmond, Fredericksburg & Potomac has ordered from the Rodger Ballast Car Co. 20 convertible ballast and flat bottom gondola cars, and one standard double plow distributing car for October delivery.

The Chesapeake & Ohio has leased from Edward T. Stotesbury, of Philadelphia, 1,000 steel gondolas, 300 wooden box cars, 400 wooden gondolas, 200 wooden coke cars, 200 wooden flat cars and 110 wooden hopper bottom gondolas.

The Southern has ordered 2,950 cars as follows: American Car & Foundry Co., 1,200 gondolas of 80,000 lbs. capacity; Mount Vernon Works, 800 gondolas of 80,000 lbs. capacity; Southern Car & Foundry Co., 500 box cars; Barney & Smith, 50 coke cars, 50 ore cars and 150 gondolas.

The Canadian Pacific is building 500 box cars of 60,000 lbs. capacity at its Hochelaga, Que., shops for August and September, 1902, delivery. The cars will be 34 ft. 6 in. long; 8 ft. 4 in. wide, and 7 ft. 1 in. high at side, all inside measurements. The special equipment includes: Steel axles, Simplex bolsters, Sterlingworth brake-beams, Westinghouse air-brakes, Canadian Pacific Ry. standard brasses, Tower couplers, Jones door fastenings, Miner draft rigging and McCord journal boxes.

The Chicago & Alton has ordered 350 flat bottom gondola cars with drop ends and 150 flat cars, both of 80,000 lbs. capacity, from the Standard Steel Car Co., in addition to the 300 coal cars reported in our issue of August 8. These cars will be 42 ft. long and 10 ft. wide, built of metal. The special equipment includes: Axles in accordance with Chicago & Alton specifications; "Solid" brake-beams; Universal brasses; Kelso couplers with 5 x 7 in. shanks; Miner draft rigging; American dust guards; springs, as per Chicago & Alton specifications, to be made by the A. French Spring Co.; Player cast-steel Diamond trucks and cast-iron 33 in. wheels to weigh 650 lbs.

The Atlantic Coast Line is building 600 box cars and 100 flat cars of 60,000 lbs. capacity at its Wilmington, N. C., shops, for January, 1903, delivery. The box cars will weigh 32,000 lbs. and will be 36 ft. long, 8 ft. 6 in. wide, and 7 ft. 6 in. high, all inside measurements. The flat cars will weigh 28,000 lbs. and will be 40 ft. long, outside measurement, built of wood, with wooden underframes. The special equipment for both includes: Steel axles, Sterlingworth brake-beams, Westinghouse air-brakes, Reeves & Son's brasses, Tower couplers, National Malleable Castings Co.'s door fastenings, Atlantic Coast Line pattern doors, Thornburgh draft rigging, Ryan dust guards, National Malleable Castings Co.'s journal boxes and lids, Atlantic Coast Line standard paint (Harrison Bros.), Armitage plastic roofs, Lehigh springs, Diamond trucks and Decatur wheels.

BRIDGE BUILDING.

ABERDEEN, OHIO.—The promoters of a trolley line from Ripley, Ohio, to Aberdeen, propose to build a bridge over the Ohio at this place.

ABERDEEN, WASH.—The city has voted to issue $20,000 of bonds for a bridge over the Chehalis River. E. G. Hunt, City Engineer.

ALEXANDRIA, S. DAK.—Bids are wanted Sept. 2, at the office of H. P. Benjamin, County Auditor, for a bridge.

APPLETON, WIS.—A new stone bridge to cross Fox River at a cost of $43,000 has been ordered by the Appleton City Council.

BENTON HARBOR, MICH.—It is said that the city officers will soon get bids for building the bridge over Paw Paw River.

BRIDGETON, N. J.—The Freeholders of Cumberland and Cape May Counties propose to replace the present drawbridge over West Creek near the village of Leesburg, with a stationary bridge. The War Department is considering the plans.

CADILLAC, MICH.—The Board of Public Works is about to get bids for building a bridge over Clam River at Lake street.

CATLETTSBURG, KY.—The Chesapeake & Ohio proposes to build a bridge over the Livisa fork of the Big Sandy River.

CHICAGO, ILL.—Bids are wanted Aug. 23 for repairing the South Ashland avenue bridge. Address the Commissioner of Public Works.

CINCINNATI, OHIO.—The Pennsylvania Co. is said to be making active preparations to abolish 28 grade crossings on its line in this city.

COLFAX, WASH.—The County Commissioners will receive bids at their meeting in September for building a bridge over the South Palouse River on the extension of Main street.

DELAWARE, N. J.—W. K. McFarlin, Chief Engineer of the Lackawanna R. R., is now receiving bids for a new bridge over the Delaware River here. It will be a double-track structure of five spans each 42 ft. c. to c. of end piers, it being a riveted Pratt truss, estimated to cost $190,000. The company will put in the foundation.

DOWNIEVILLE, CAL.—Bids will be received by Henry E. Quigley, County Clerk, up to 10 a.m., Sept. 15, for building a combination wood and iron bridge across the north fork of North Yuba River, known as the Hansen bridge, in Downieville. Plans and specifications on file with Supervisors.

ELYRIA, OHIO.—The city, according to report, has decided to build a bridge over the river at Thirteenth street. No action has as yet been taken in regard to rebuilding the Washington avenue bridge. C. H. Snow, City Engineer.

EXIT, VA.—The Supervisors of Nansemond County will, in about two weeks, let the contract for a steel bridge 148 ft. long at this place.

HONDO, TEXAS.—Plans and specifications, with estimated cost, for a steel and iron wagon bridge, with 16 ft. clear roadway, floor at least 10 ft. over high water mark of 1900, for both stone piers and also steel piers separately, across the Medina River at Castroville, will be received by the Commissioners' Court of Medina County, at Hondo, Oct. 1. H. E. Haass, County Judge.

JOHNSTOWN, PA.—Steps are being taken to abolish the grade crossings in this vicinity. H. O. Lewis, Assistant City Engineer, can give information.

LEWISTON, IDAHO.—The Oregon R. R. & Navigation Co., it is said, is preparing to build a bridge over Clearwater River. It has not yet located the site.

MANSFIELD, OHIO.—Bids are wanted Aug. 23 for a steel bridge over Toby's Run. D. S. Koontz, City Clerk.

MEMPHIS, TENN.—County Treasurer J. H. McBride is to sell $30,000 of bonds, part of which are to pay for new bridges in the county.

MENOMINEE, MICH.—It is said that the Wabash R. R. proposes to build a new bridge over the Menominee at this city.

MIDDLETOWN, PA.—Town Council has passed on second reading the ordinance providing for three subways, to be erected by the Pennsylvania Railroad at Union, Wood and Catharine streets at a total cost of $60,000, divided as follows: Union, $25,000; Wood, $25,000; Catharine, $10,000. In all the railroad company will spend over $100,000 in that town.

MILWAUKEE, WIS.—The bridge on which bids are wanted Sept. 5 by the Board of Public Works will be a bascule bridge to cross the North Menomonee at Muskego avenue. The total length of the structure will be 157 ft. 9 in., and will have two lift spans giving a clear channel opening of at least 70 ft. The roadway will be 34 ft. wide. There will be two sidewalks, each 8 ft. wide. Chas. J. Poetsch, City Engineer.

MINNEAPOLIS, MINN.—Bids are wanted until 11 a.m., Aug. 25, by Hugh R. Scott, County Auditor, for rebuilding two bridges and for other work.

MONTGOMERY, ALA.—Contracts for bridges, etc., on the line of the Western Ry. of Alabama are to be let at once. J. W. Gannon is Chief Engineer.

MUNCIE, IND.—The Lake Shore & Michigan Southern will replace the bridge over White River at Muncie.

NEWARK, N. J.—The Lackawanna R. R. proposes bridging Fifth avenue in this city, and Park avenue in East Orange. The Board of Freeholders is considering the railroad's proposition.

NEW YORK, N. Y.—The President of The Bronx has made arrangements with the New York & Harlem R. R. to build a $150,000 bridge over the tracks at Woodlawn Station, 233rd street. Plans have also been made for a bridge across the Bronx River at Tremont avenue; also for a bridge over the tracks of the New York, New Haven & Hartford at Westchester avenue, and still another at 189th street.

PERTH AMBOY, N. J.—The County Freeholders have accepted the plans made by Thomas McCann for the bridge at Perth Amboy. The Board will act on the $150,000 bond issue on Sept. 3, if their bid for the work is accepted by that time.

PERU, IND.—The County Commissioners are considering the advisability of building a bridge over Wabash River at Broadway, at a cost of about $40,000.

PITTSFIELD, MASS.—The city has made an additional appropriation of $4,000 for the Dalton avenue bridge, making the total appropriation $18,000.

PORT DEPOSIT, MD.—The County Commissioners propose to build a bridge over Rock Run near Port Deposit.

RED BLUFF, CAL.—The Board of Supervisors has decided to build a steel bridge across Cottonwood Creek on the Vestal road. Bids will be received up to 10 a.m. Sept. 3.

REDDING, CAL.—Bids are wanted Sept. 10 for a bridge over Cottonwood Slough near Cottonwood. W. O. Blodgett, County Clerk.

SAN JOSE, CAL.—Bids are wanted Sept. 2 by the Board of Supervisors of Santa Clara County for building the following bridges: Concrete bridge over Calavazas Creek; concrete bridge on Payne avenue over San Tomas Creek; concrete bridge on Williams Road over San Tomas Creek; concrete and stone bridge over Rundell Creek on the Los Gatos & Santa Cruz road; concrete and stone bridge over the Los Gatos Creek at Alma. Plans for all are with the Board of Supervisors. Henry A. Pfister, Clerk.

SAVANNAH, MO.—J. E. Schnitzius, Commissioner, will receive bids on Sept. 1 for 11 bridges.

THREE RIVERS, MICH.—Bonds to the amount of $15,000 are to be issued for the bridge over the St. Joseph River.

VICTORIA, B. C.—It is said that the city will soon ask bids for building the Point Ellice bridge.

WATERVILLE, ME.—A suspension footbridge will be built between Waterville and Winslow over the Kennebec at once, according to report. Hon. W. T. Haines, of Augusta, is interested.

WELLSBURG, OHIO.—The Wellsburg-Brilliant Bridge & Ferry Co. has been chartered, with $50,000 capital, to build a toll bridge over the Ohio between Wellsburg and Brilliant.

Other Structures.

BALTIMORE, MD.—The Western Maryland R. R. is said to have secured a site for its proposed terminals, and it is also said that work will be begun pretty soon.

CLARKSVILLE, TENN.—The Tennessee Central has decided on a site for its passenger and freight stations, which, it is stated, will be on the corner of Main and Spring streets.

CLEVELAND, OHIO.—The Cleveland Furnace Co. has just secured title to 80 acres in Brooklyn Township, on which it will build its proposed steel plant.

COLLINGWOOD, ONT.—The Collingwood Ship Building Co., Ltd., proposes to extend its plant and is now increasing its capital with this object in view.

ELIZABETH, N. J.—The Central R. R. of New Jersey will begin work at once on building five additional shops at Elizabethport.

IRONVILLE, OHIO.—The Wheeling & Lake Erie proposes to build a roundhouse at this place.

KANSAS CITY, KAN.—It is said that the Safety Angle Bar & Railroad Supply Co. has been organized to build a rolling mill in Kansas City. D. M. Estey, of Owosso, Mich., is interested.

KNOXVILLE, TENN.—The Knoxville, Lafollette & Jellico will build a large passenger station in this city in the near future.

MART, TEXAS.—The International & Great Northern will build railroad shops and a roundhouse here.

MEMPHIS, TENN.—The Bon Air Coal Co., and the Buffalo Iron Co., have recently been consolidated under the title of the Bon Air Coal & Iron Co., with a capital stock of $5,000,000. It proposes to improve the furnaces now in operation at Allen's Creek, and to equip one or more of the idle furnaces now owned by the company.

MOBILE, ALA.—It is said the Louisville & Nashville is about to begin work on the proposed station and several thousand feet of wharfage.

MONESSEN, PA.—The Page Woven Wire Fence Co. is planning extensive improvements to its plant in Monessen. The company has recently been reorganized and has considerable capital available for improvements.

MONTREAL, QUE.—Messrs. Lassard & Harris, of Montreal, have received the contract from the Canadian Pacific to build four of the buildings of the new car and locomotive shops which will be established at Hochelaga. The price for the four buildings is $235,000.

NEW CASTLE, PA.—The main building of the Steel Car Forge Co. is being enlarged from 310 to 490 ft. A large amount of new machinery will also be added.

ST. LOUIS, MO.—It is said that the St. Louis Terminal Association will spend about $5,000,000 in the new con-

struction and terminal improvements to be begun at once and continued until the Exposition opens in May, 1904.

SPRINGFIELD, OHIO.—The Bettendorf Metal Wheel Co. is building an addition 250 x 175 ft. to its plant. After making the addition, the daily double turn capacity will be about 125 tons of finished product.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

New York Railroad Club.

The next regular meeting will be held at the Club's rooms, 349 Madison avenue, New York City, on the evening of Sept. 18. The subject will be "Track Construction for Fast and Heavy Loads on Electric Lines." This subject will be introduced by a paper by Mr. J. C. Brackenridge, Chief Engineer of the Brooklyn Rapid Transit Co., who is well qualified to speak with authority on the matter.

The Traveling Engineers' Association.

The Tenth Annual Convention of the Traveling Engineers' Association will be held at Chicago, Ill., commencing at 9 a.m., Sept. 9. The Stratford Hotel, corner of Jackson and Michigan Boulevards, has been selected as the headquarters. Arrangements have been made with the Pullman Co. for a rate of one half fare for members and their families to and from the convention. W. O. Thompson, Secretary, 7 Manning Square, Albany, N. Y.

PERSONAL.

—Mr. James B. Donner, Superintendent of Telegraph of the Harriman System of railroads, died at San Antonio, Texas, Aug. 14. Mr. Donner was 37 years old. His office was in San Francisco.

—Mr. Alexander Herford, aged 85, died at Canton, Ohio, Aug. 13. He was active in building the Ohio & Pennsylvania, now the Pittsburgh, Fort Wayne & Chicago R. R., and was for a number of years an officer of the company.

—Mr. David P. Wing, Superintendent of the Florida East Coast Ry., with office at St. Augustine, died a few days ago while spending his vacation at Van Buren, Ark. He went to St. Augustine about 10 years ago as Train Despatcher and was later promoted to Chief Train Despatcher, Trainmaster and then Superintendent. He was 48 years old.

—Mr. R. M. Kimber, who was on August 1 appointed Superintendent of the Galesburg Division of the Chicago, Burlington & Quincy, began service on that road at Galesburg as brakeman in 1875. In 1877 he held the position of freight conductor, and in May, 1888, became Trainmaster of the Galesburg Division. He was promoted to Assistant Superintendent at Galesburg, on Aug. 1, 1899.

—Mr. Millard V. Harris, Auditor of the Chicago, Rock Island & Texas, died at Fort Worth, Texas, on Aug. 8. Mr. Harris was born in 1855 at Mt. Vernon, N. Y., and has been in railroad service since 1886. In that year he became clerk in the Auditor's office of the Chicago, Rock Island & Pacific at Topeka, Kan., and in 1893 he was appointed Auditor of the Chicago, Rock Island & Texas.

—Mr. Adolph H. Schwarz, who recently left the Delaware, Lackawanna & Western, was for 16 years Superintendent of the Syracuse and Utica Divisions of that road. He resigned to become Manager of the W. K. Niver Coal Co. at Syracuse, N. Y. For six years previous to 1872, the date of his appointment to the Lackawanna, he was employed on the Erie at Binghamton. In 1886 he was appointed Superintendent of the Oswego & Syracuse and the Syracuse & Binghamton Divisions, and in 1899 the Utica Division was added to his charge. Mr. Schwarz is also a member of the Central New York Car Service Association.

—Mr. Edmund Phillips Hannaford, formerly Chief Engineer of the Grand Trunk Railway System, died suddenly in Montreal, Que., on Aug. 19. Mr. Hannaford was born in England, Dec. 12, 1834, and got his early training as a draftsman and assistant under Sir I. K. Brunel from 1851 to 1855. He was with the engineering corps of the South Devon Ry. in 1855. In 1857 he went to Canada and joined the Grand Trunk as Assistant Engineer, remaining as such until 1866, when he was appointed Chief Engineer of the Western Division, which position he occupied until 1869. In that year he was appointed Chief Engineer of the system and held that office for 25 years, having resigned in 1894. Mr. Hannaford was also Chief Engineer of the International Bridge and Chief Engineer of the Montreal & Champlain Junction Ry.

—Mr. W. B. Throop, the new Superintendent of the Chicago Division of the Chicago, Burlington & Quincy, began service with that company as chainman for an engineering corps in the early part of 1878. He has been with that company ever since August, 1879, when he was assigned to the position of Division Engineer. In March, 1882, he was in charge of the construction of various pieces of work, mainly on completed lines, until October, 1884, when he became Roadmaster of the Chicago Division, holding that position until February, 1890. Then he was Superintendent of the St. Louis Division for three years until March, 1893, when he was promoted to be Superintendent of the Galesburg Division. On Aug. 1 of this year he was appointed to his present position, with headquarters at Aurora, Ill. Mr. Throop graduated from Cornell University in 1877.

—Mr. H. D. Hunter, who was recently appointed Division Superintendent of the Missouri Pacific at Osawatomie, Kan., was born at Ashley, Ill., July 31, 1858. He began his railroad career in the fall of 1876 as brakeman on the St. Louis & Southeastern. He became a freight conductor on that road in 1879, and a passenger conductor in 1882, serving two years in this latter capacity, when he resigned to accept service with the Wabash, remaining with that company in similar positions until 1890. In that year he was made General Yardmaster and Trainmaster at Memphis for the Kansas City, Fort Scott & Memphis, holding that position until 1892, when he was appointed Yardmaster on the Missouri Division of the St. Louis, Iron Mountain & Southern at Poplar Bluff, Mo. In July, 1899, he resigned, having accepted the position of General Yardmaster for the Missouri Pacific at Sedalia, Mo., and he held this latter position until a few weeks ago.

—Mr. F. Mertsheimer, who has recently been appointed Superintendent of Machinery of the Denver & Rio Grande, was from 1880 to 1887 Master Mechanic of the Colorado Division of the Union Pacific; 1887 to August, 1890, Master Mechanic of the Kansas Division, and from August, 1890, to January, 1891, he was Superintendent of the Wyoming Division, then Assistant Superintendent of Motive Power & Machinery at Cheyenne, Wyo., to Sept. 1, 1893. From this latter date to Aug. 25, 1897, he was Master Mechanic of the Kansas Division of the Union Pacific at Armstrong, Kan. He left the Union Pacific in 1897 to become Superintendent of Motive Power of the Kansas City, Pittsburgh & Gulf, and from December of that year to June 1, 1899, he was General Superintendent and Superintendent of Motive Power of that road. From June 1, 1899, to Aug. 1, 1902, he was Superintendent of Motive Power and Machinery of the Kansas City Southern, successors to the K. C., P. & G.

—Mr. Johnson B. Flanders, the new General Superintendent of the Detroit Southern Railroad, entered railroad service Dec. 24, 1863, at the age of 15, as water boy on the Ohio & Mississippi Ry., and rose to be brakeman, fireman, then engineer on a steam shovel until Dec. 1, 1869, when he went with the Vandalia Line in somewhat similar positions, remaining there until December, 1879, when he left to accept service with the Wabash, St. Louis & Pacific as passenger conductor. Aug. 1, 1882, he accepted service with the Missouri Pacific, and on July 1, 1884, he was appointed Trainmaster, remaining as such until Aug. 1, 1885, when he was appointed Division Superintendent of the same road. He left that company May 21, 1888, to become Superintendent of the Cincinnati, Jackson & Mackinaw, and its successor, the Cincinnati Northern, and on Feb. 1, 1899, was appointed General Superintendent of the Cincinnati Northern. He resigned the General Superintendency of the Cincinnati Northern to accept the same position with the Detroit Southern on Aug. 1 of this year.

ELECTIONS AND APPOINTMENTS.

Ann Arbor.—At the annual meeting Aug. 16, the following new directors were elected: George J. Gould, Alvin W. Kreck and Joseph Ramsey, Jr. They succeeded J. Edward Simmons, R. C. Martin and Henry W. Ashley. The new board will meet on Aug. 25, to elect officers.

Arkansas & Choctaw.—See St. Louis & San Francisco.

Atchison, Topeka & Santa Fe.—J. W. Walker has been appointed Superintendent of Terminals at San Francisco. He was formerly with Lantry & Sons, who are building the China Basin near San Francisco.

Atlantic Coast Line.—Wilbur McCoy, formerly Freight Claim Agent of the Plant System, has been appointed Agent of the Land and Industrial Departments of the Atlantic Coast Line, with office at Jacksonville.

Baltimore & Ohio.—R. F. Kelker, Assistant Engineer of the Baltimore Division, has been made Division Engineer Maintenance of Way of the Cleveland Division, in place of J. H. Abbott, resigned. E. P. Laird, Assistant Engineer of the Ohio River Division, has been transferred to the Cleveland Division. Messrs. W. E. Cavey and C. F. Richardson are appointed General Road Foremen of Engines, with headquarters at Baltimore, Md. Frank G. Adams, who has been Manager of the telegraph offices in Baltimore, has been promoted to Circuit Manager of all telegraph lines, including the Baltimore & Ohio Southwestern.

G. F. Malone has been appointed Assistant Superintendent of Car Service with office at Baltimore.

Buffalo, Rochester & Pittsburgh.—H. S. Burgesser, formerly Commercial Agent at Philadelphia, has been appointed General Eastern Freight Agent, with headquarters in New York City.

Canadian Northern.—J. M. Robb has recently been appointed Superintendent of Motive Power, with headquarters at Winnipeg.

Canadian Pacific.—A. Price, heretofore Division Superintendent at Toronto, has been appointed Superintendent of the lines west and north of Toronto Junction, succeeding F. P. Brady, promoted. His office will remain in Toronto.

Chicago & Alton.—A. Griggs has resigned as Superintendent of the Eastern Division. The Eastern and Middle Divisions are now consolidated as the Eastern Division, with E. Ryder, formerly at Kansas City, Mo., in charge, with office at Bloomington, Ill. W. M. Corbett, heretofore Superintendent of the Middle Division at Springfield, Ill., has been transferred to the Western Division, succeeding Mr. Ryder.

Chicago, Indianapolis & Louisville.—O. C. Carter, heretofore General Stone Agent, has been appointed General Freight Agent. His former office has been abolished.

Chicago, Rock Island & Pacific.—Under the plan of reorganization the passenger department is as follows: K. E. Palmer, the Illinois Division, not including the Peoria line or the cities of Chicago or Moline; S. F. Boyd and R. S. Torrington, the Missouri Division and the Peoria line, excluding the city of Peoria, the Washington & Knoxville branch and that portion of the Des Moines Valley Division and northern district lying south of the main line Iowa Division and including the cities of Davenport, Rock Island and Moline; J. G. Farmer, E. A. Soule and A. L. Steece, the territory included in the Des Moines Valley Division north of the city of Des Moines, the Sibley branch, northern district lines north of the Main Line Iowa Division, the cities of Council Bluffs, Davenport, St. Paul and Minneapolis not being included.

F. W. Thompson, General Agent of the Passenger Department of the Denver & Rio Grande at San Francisco, has been appointed General Western Freight and Passenger Agent of the Rock Island System, with headquarters in San Francisco. Mr. Thompson was with the Rock Island before he took service with the Denver & Rio Grande, in 1900.

Choctaw, Oklahoma & Gulf.—J. W. McLoud has been appointed General Attorney, with office at Little Rock, Ark.

Cincinnati Northern.—J. R. Cavanagh has been appointed Superintendent of Car Service, with office at Indianapolis, and George Tozzer has been appointed Purchasing Agent, with office at Cincinnati.

Cincinnati, Richmond & Muncie.—R. R. Sutherland has been appointed General Superintendent, with office at Richmond, Ind.

Detroit Southern.—E. M. Roberts, whose resignation as Superintendent of Motive Power and Equipment was announced last week, tells us that no action has been taken on his resignation, and it is likely he will stay with the company.

El Paso & Rock Island Route.—John Harris has been placed in charge of building the Dawson branch, of which he will be Superintendent. He formerly was with the Choctaw road.

Erie.—D. M. Bowman has been appointed General Western Passenger Agent, with office in the Western Union Building, Chicago, to assume the duties of F. W. Buskirk, formerly Assistant General Passenger Agent, resigned.

Florida East Coast.—C. G. Wakeley has been appointed Superintendent, succeeding the late David P. Wing, with headquarters at St. Augustine, Fla.

Illinois Central.—A. J. Greif, Superintendent of the Yazoo & Mississippi Valley line at Vicksburg, Miss., has resigned. Mr. Greif will go to Cienfuegos, Cuba, on Oct. 1, to become Superintendent of a 160-mile railroad. John Paul, Superintendent of Terminals at New Orleans, will succeed A. A. Sharp as Division Superintendent, Yazoo & Mississippi Valley, at Memphis, promoted.

Intercolonial.—E. G. Russell, Manager, with headquarters at Moncton, N. B., has resigned and the office is abolished. James E. Price has been appointed General Superintendent, with headquarters at Moncton. He will have charge of the Maintenance of Way and Works, and of the Station and Train Services. Evan Price has been appointed Superintendent of the Moncton & Ste. Flavie District, succeeding James E. Price. The changes were effective Aug. 15. Mr. Russell's address after Sept. 10 will be 908 Elmwood avenue, Buffalo, N. Y. E. T. Horn, assistant to Mr. Russell, has also resigned.

Jonesboro, Lake City & Eastern.—F. C. Bryant has been appointed General Freight and Passenger Agent, with headquarters at Jonesboro, Ark., succeeding W. H. Stevens, resigned.

Lake Erie & Western.—H. H. Storrs has resigned as Assistant General Superintendent at Cleveland, to accept a similar position with the Lake Shore & Michigan Southern. Effective Aug. 20. Dewitt C. Moon, Superintendent of the Rome, Watertown & Ogdensburg Division of the New York Central, succeeds Mr. Storrs.

Lake Shore & Michigan Southern.—S. K. Dickerson, Division Master Mechanic at Cleveland, has been transferred to the new shops at Collinwood, Ohio. See also Lake Erie & Western.

Lehigh Valley.—Charles B. Jarvis is appointed New England Agent, effective August 20, with office at 201 Washington street, Boston, Mass., succeeding Nathaniel Duke, resigned. Mr. Jarvis will also be in charge of the office at 39 Church street, New Haven, Conn.

Louisville & Nashville.—L. Watt Allen has been appointed Superintendent of Construction on the extensions to reach the new machine shops at New Decatur, Ala.

Missouri, Kansas & Texas.—R. R. Hammond, formerly Superintendent of Maintenance for the St. Louis & San Francisco, has been appointed Assistant General Manager of the M., K. & T., with headquarters in St. Louis.

Missouri Pacific.—C. E. Carson, Superintendent of Terminals in Kansas City for the Missouri Pacific, has been appointed Superintendent of Terminals for the Missouri Pacific and Iron Mountain roads in St. Louis, succeeding J. F. Jones, resigned. W. S. Carson, at present Yardmaster at St. Louis for the Terminal Railroad Association, succeeds his brother, C. E. Carson, at Kansas City.

Mobile & Ohio.—Horace W. Clarke, Superintendent of the St. Louis Division at Cairo, has been appointed Superintendent of Transportation, with office at Mobile, Ala., succeeding J. N. Seale, resigned. E. W. Moore succeeds Mr. Clarke at Cairo, and A. G. Abell succeeds Mr. Moore as Trainmaster of the Murfreesboro District of the St. Louis Division, with headquarters at Cairo.

New York Central & Hudson River.—Allan Bourn, Purchasing Agent, has resigned, his resignation being effective Sept. 1. See also Lake Erie & Western.

Northern Pacific.—S. H. Draper has been appointed Road Foreman of Engines on the Idaho Division extending between Hope and Spokane Falls, Wash.

Rapid Transit Subway (New York City).—M. C. Hamilton, heretofore Roadmaster on the New York, New Haven & Hartford R. R. at Hartford, Conn., has been appointed Engineer Maintenance of Way for the New York Rapid Transit Subway Construction Company, with office in the Park Row Building, New York City.

Rio Grande R. R.—J. Celaya, who resigned as General Manager, remains with the company as Treasurer. His brother, President A. Celaya, is now General Manager also.

Rio Grande Western.—J. D. Mansfield, General Agent, Passenger Department, at Portland, Ore., has been appointed General Passenger Agent at San Francisco, succeeding F. W. Thompson, resigned. W. C. McBridge, at Butte, Mont., will succeed Mr. Mansfield at Portland.

St. Louis & San Francisco.—Capt. J. F. Hinckley, Chief Engineer of Construction of the S. L. & S. F., has been placed in charge of the construction of the Arkansas & Choctaw Ry., and F. E. Dewey has been appointed Superintendent of Construction of A. & C. line, with headquarters at Hugo, Ind. T. F. W. Valliant, heretofore Chief Engineer of the Arkansas & Choctaw and the Choctaw Construction Co., resigned those positions when the St. Louis & San Francisco took control. See also Missouri, Kansas & Texas.

Seaboard Air Line.—W. H. Doll, General Agent of the Passenger Department at Washington, has resigned.

Southern.—J. N. Seale, whose appointment as Superintendent of Transportation was announced last week, succeeds E. E. Betts, who has resigned as Superintendent of Car Service, the latter office being abolished. M. A. Hays has severed his connection with the company as Agent for the Land & Industrial Department at Boston, to become Secretary of the Chamber of Commerce of Sault Ste. Marie, Mich.

Stillmore Air Line.—Chas. C. Brown, General Freight and Passenger Agent, with office at Wadley, Ga., has resigned.

Union Pacific.—N. J. O'Brien, recently Superintendent of the Danville Division of the Southern, has been appointed Trainmaster on the Union Pacific at North Platte, Neb.

Union Station & Terminal Association of Detroit.—J. W. Sherwood, formerly General Superintendent of the Detroit Southern, has been appointed Manager, succeeding F. E. Dewey, who has gone with the St. Louis & San Francisco.

Velasco, Brazos & Northern.—Recent changes are: President, C. C. Waller; Vice-President and General Manager, E. P. Spears; Secretary, L. R. Bryan.

Wabash.—A. O. Cunningham is appointed Bridge Engi-

neer, with headquarters at St. Louis, Mo. Appointment effective Aug. 15.

Washington & Columbia River.—John D. Jones has been appointed Master Mechanic, with office at Walla Walla, Wash., succeeding J. W. Ashton, promoted.

Weatherford, Mineral Wells & Northwestern.—The entire Board of Directors of this company has resigned, to take effect Oct. 15, on which date an election will be held.

White Pass & Yukon.—D. S. Wagstaff has been appointed Superintendent of Transportation. He was formerly District Passenger Agent of the C., H. & D.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Alabama Roads.—Contract is reported let for a short railroad from Adger, Ala., to new coal mines owned by the Alabama Wire & Steel Co. The road connects the Birmingham Mineral with the Alabama Great Southern.

Arizona Roads.—It is said that the New England Copper Co. will build a railroad above Clifton to connect its mines with the Arizona & Southwestern.

Atchison, Topeka & Santa Fe.—Surveyors are in the field locating a new line between Port Richmond, Cal., and Oakland, where new terminals are to be established. The route follows the old California & Nevada right of way. The California & Nevada was a narrow gage road extending between Bryants and Oakland, 22 miles, purchased by the Atchison, Topeka & Santa Fe, but a formal decree of the sale of the property will have to be made by the Federal Court before building can begin.

Boston & Maine.—The new electric line built by this company from Manchester to Concord, N. H., was opened Aug. 18. In the award of the franchise for the line the railroad company was given the preference over private individuals, for the reason that it was believed it was in position to give a better service. The equipment is to be of the same character as that of steam roads. On July 11 the Massachusetts Railroad Commissioners approved the purchase of the Upton Street R. R. by the Grafton & Upton steam railroad, and this was the first instance in the State of the absorption of an electric by a steam railroad.

Boston & Providence Electric.—Plans are reported practically completed for this combination route between Boston and Providence, R. I. At Boston trackage rights are reported secured from the Boston Elevated as far as Forest Hill, and from the Old Colony Street R. R. to Readville. A connection less than one mile long at this point will be made with the Blue Hill Street R. R., which it is proposed either to lease or to buy. This carries the line as far as Stoughton, where a connection is to be built with the Norton & Taunton Street line at North Easton. A further branch will be built from this line into Rhode Island.

Chicago & North Western.—On Aug. 13 the line from Evan Junction was opened for traffic to Marshall by way of Wabasso, a distance of 47 miles. Work was begun on this line just about a year ago.

Choctaw, Oklahoma & Gulf.—It is said that the Texas Railroad Commission has been officially informed that this company will extend southwest from Amarillo, Texas, to Tecumsecara, N. Mex., a distance of about 135 miles, forming a connection at Tecumsecara with the El Paso line of the Chicago, Rock Island & Pacific.

Cincinnati, Richmond & Muncie.—An officer denies the current press report that an extension is likely to be built south from Cincinnati through undeveloped lumber regions in the direction of New Orleans.

Clallam Bay & Southern.—This company has been incorporated at Seattle, Wash., to build from Clallam Bay, in Clallam County, up the river bearing the same name to tidewater near the mouth of the Quillayute River. One and one-half miles of the road has already been completed out of the total distance of about 36.

Delaware & Northampton.—Surveys are reported for this projected line in Northampton County, Pa., and bids for building the road will be received by B. S. Dunn, President, 25 Broadway, New York. The projected line is to run from a point near Sandt's Eddy to the Borough of Stockertown, six miles. (July 25, p. 600.)

Devil's Lake & Northern.—Work is reported resumed on this road from Devil's Lake, N. Dak., to Starkweather, 30 miles north, and it is said that it will be completed before winter. Some grading was done last year.

Grand Trunk.—In reference to the rebuilding of the line between Glencoe, Ont., and Fort Erie, opposite Buffalo, an officer writes that the work undertaken and to be completed this fall consists of rebuilding of bridges, to cost approximately $250,000, in addition to the heavy rails to be laid, ballasting of track, etc., mentioned last week. (See under Wabash, Aug. 15, p. 650.)

It is said that a third track will be laid through the city of Hamilton, Ont., along the main line, to enable trains to run to and from the King street station and take the main line without going to the Stuart station, which involves some loss of time through switching.

Houston-Laporte (Electric).—Surveys are reported for an electric road about 30 miles long, to run from Houston, Texas, to Laporte, on Trinity Bay. The projected route parallels the Southern Pacific. It is said that eastern men are interested.

Little River Valley.—This company was organized in Louisiana Aug. 7, with a capital stock of $500,000, to build from Georgetown, on the Iron Mountain R. R., 35 miles north of Alexandria, and to run in a northerly direction through the parishes of Grant and Winn, and also in a southwesterly direction through the parishes of Grant and Catahoula. Stephen R. Lee, of Pollock, La., is President. The company's office will be at Alexandria.

Louisiana & Arkansas.—Contract for the Natchez extension from Winnfield, La., to Jonesville, has been let to R. M. Quigley Construction Co. The distance is 50 miles. (April 11, p. 278.)

Louisville & Nashville.—Franchise was granted this company in New Orleans Aug. 6 to extend its tracks within the city for a distance of 600 ft., to re-adjust existing tracks and make other improvements in connection with the lines there.

Madrid (Maine).—Grading is reported in progress on this new line from Madrid to Holman's Mill, a distance of 6½ miles. The company filed articles of association June 21, and will build a narrow gage road. Fletcher Pope, S. G. Haley and others, of Phillips, Me., are interested. (July 4, p. 543.)

Memphis & Chicago.—A company with this name was chartered in Missouri Aug. 4, to build a road nine miles long from a connection with the St. Louis, Memphis & Southeastern, now partly built at Rennays, extending through Cape Girardeau and Scott Counties, and crossing the Mississippi River at Gray's Point, to a connection with the Chicago & Eastern Illinois at Thebes, Ill. (See St. Louis, Memphis & Southeastern, July 4, p. 544.)

Missouri, Kansas & Oklahoma.—Work is reported begun at a point three miles from Wybark, Ind. T., on the line to reach the main road at some point in the Osage Nation. The total distance of this branch is about 78 miles, and location was reported last spring. L. P. Yale, Wainwright Building, St. Louis, is Chief Engineer. (March 7, p. 170.)

Missouri Pacific.—An officer is quoted as saying that the proposed extension from Marianna, Ark., to Trippe Junction is part of the proposed line from Memphis to connect with the New Orleans & North Western at Clayton, Concordia Parish, La. The total distance from West Memphis to Clayton is 294 miles, and there are no heavier grades than .3 of 1 per cent. The maximum curvature except at connections with other roads, is 3 deg.

Mount Tamalpais.—Work will begin soon on a branch from a point on the Scenic Road known as West Point, to Bolinas Bay, a distance of three miles.

Muncie & Portland Traction.—This company has been organized in Indiana to build an electric line between the points named through the towns of Albany, Redkey and Dunkirk. The projected line is about 30 miles long, paralleling the Lake Erie & Western. G. O. Driscoll, of Muncie, Ind., is President.

Nevada-California-Oregon.—An officer is quoted as saying that a corps of engineers is to be put in the field soon to survey a line from Madeline, the present northern terminus, to Lake View, Ore., 95 miles, and that if possible, a portion of the grading will be done this fall. Track laying will depend upon the rolling mills owing to the present difficulty in securing rails. Surveys for such a line were also reported last February. (Feb. 28, p. 154.)

New York, Ontario & Western.—Double-tracking began on the line between Cornwall and Cadosia, N. Y., on Aug. 13, a distance of 107 miles. This work was recommended to the directors of the company last spring and an inspection was made in May. According to the recommendation of President Fowler at that time, the work was to be spread out over three or four years, beginning at the most congested point. The estimated cost is about $15,000 a mile. Cadosia is the junction point of the Scranton branch.

Norfolk & Western.—Press reports state that work will be resumed at once on the Speedwell extension from Ivanhoe, Va., through the Cripple Creek Valley to Speedwell, 20 miles. A portion of the line was graded last year by L. H. Vaughan & Co., of Roanoke, and by Roxley & Gibson, of Huntington, W. Va., but operations were then suspended. It is said that the work will now begin at Ivanhoe and proceed westward, and that the road will be completed within a few months.

Pamlico, Oriental & Western.—This road is projected to be built from Newbern, N. C., by way of Bayboro, Stonewall, Oriental and Vandemere to a point near the mouth of Goose Creek, these places, except Newbern, being in Pamlico County. The total distance is about 40 miles, and a bridge will be necessary over the Neuse River at Newbern, where connection will be made with the Atlantic & North Carolina and the Atlantic Coast Line. There are at present no railroads in Pamlico County. The names of builders interested are not stated.

Pittsburgh, Fairport & Lake Erie Dock & Terminal.—Incorporation was granted this company in New Jersey Aug. 15, with the New Jersey Corporation, Guarantee & Trust Co. as agent. The objects include the building of railroads, docks, bridges, etc., and the incorporators are Wm. J. F. Reynolds, E. B. Miller and others, of Camden. Address, 419 Market street, Camden.

Rossville & Eastern.—Incorporation was granted this company in Illinois on Aug. 13, to build from Rossville in Vermillion County, to a point on the State line between Indiana and Illinois, with principal office at Chicago. The incorporators are Roswell B. Mason, Clarence B. Cardy and others, of Chicago.

Santa Fe Central.—The grading camp of this company is now at Vega Blanca, and grading has commenced on the line between Vega Blanca and Donaciano, on the Arroyo Grande. About 8½ miles of road have been graded and the telegraph line is completed between Clark and Santa Fe. The line from Torrance to Clark will be finished in about two weeks.

Seaboard Air Line.—It is said that contracts will be let at once to grade a 10-mile section between Coal City and Birmingham. Surveys were reported in progress for this projected entrance into Birmingham last July, and the route established starts at Coal City, on the East and West R. R. of Alabama, runs north of Branchville across Oak Ridge at Elbow Gap, and proceeds down the Coosa Valley along the east prong of Black Creek, crossing at Martin's Ford, and running thence east towards Birmingham, a distance of about 45 miles. (July 4, p. 544.)

Sioux Falls & Manitoba.—Articles of incorporation were filed for this company at Pierre, S. Dak., on Aug. 13. Its purpose is to build a line from Sioux Falls to Madison, a distance of 50 miles. The directors are B. F. Sherman, J. L. Bratager and others, of Sioux Falls; J. E. Colton, of Colton.

Slatington-Hot Springs.—It is said that the Southwestern Slate Mfg. Co., with headquarters at Slatington, Ark., will build a railroad between these two points, 56 miles distant. Curtis Wright, of Carthage, Mo., is President of the slate company.

Sligo & Eastern.—Charter was granted this company in Missouri Aug. 9, to build from Sligo in Dent County, to Dillard in Crawford County, 12 miles. Edward F. Goltra, G. P. Whyte, A. B. Shepley and others, of St. Louis, are the incorporators.

South Bend & Southern Michigan Electric.—Franchise has been secured from Niles for this proposed line, which is to run between Niles, Mich., and South Bend, Ind., a distance of about 11 miles, and an application has been made to the Commissioner of Railroads for the approval of a grade crossing of this line with the tracks of the Michigan Central in the city of Niles.

Southern.—An officer is quoted as saying that two corps of engineers are now working on an extension of the Murphy branch from a point at or near Bushnell, N. C., down the Little Tennessee River to Maryville, Tenn., a distance of about 60 miles, with the ultimate intention of continuing the line at once through Rabun Gap into Georgia and the western part of South Carolina.

Southern Pacific.—An officer is quoted as saying that a line will be built from Cochise to Naco, Ariz., to connect with the Cananea road.

Temiskaming & North Bay.—At a meeting of the Commission appointed by the Government to build this road, held in Toronto Aug. 9, Geo. E. Mountain, Chief Engineer of the Canada Atlantic, was appointed Consulting Engineer. The Commission will call for tenders for the clearances for the right of way, grading, etc. A. E. Ames, of Toronto, is chairman of the Commission.

The Dalles Ry. & Navigation.—A company has been incorporated at Portland, Ore., with a capital of $500,000, to build a line starting from The Dalles and following the tracks of the Oregon Railroad & Navigation line for about three miles, striking thence into the interior and traversing a pass between Fifteen-mile Creek and the Des Chutes River, coming out to the O. R. & N. again a few miles from Briggs. The incorporators are W. H. Moore, E. M. Williams and J. T. Peters, all of The Dalles. The projected distance is 25 miles or more, lying in Wasco and Sherman Counties, and a crossing of the Des Chutes River is involved.

Union Pacific.—An officer denies current press reports that this company will rebuild the line of the Omaha & Republican Valley.

Wabash.—Surveys are reported for a line from Moravia to the center of New Castle, Lawrence County, Pa., a distance of about eight miles, following the route of the old Erie Canal along the banks of the Beaver River north from Moravia.

Washington Roads.—As a result of a conference between officers of the Great Northern, Northern Pacific and Oregon R. R. & Navigation Companies, it is said that a union road 25 miles long will be built in the Big Bend country, running from Coulee City to Adrian. Coulee City is the present terminus of the Central Washington branch of the Northern Pacific, and Adrian is on the line of the Great Northern. The projected line would save the Northern Pacific the long back haul of 150 miles in carrying freight of the Big Bend country to the coast. It is expected that the line will be begun at once and completed before winter.

West Virginia Roads.—Work is reported in progress on a railroad from the White Oak branch of the Chesapeake & Ohio to new coal fields in Fayette County, W. Va., seven miles distant. The line is in the interest of the White Oak Valley Co., and S. Dixon, of Scarboro, W. Va., is President.

GENERAL RAILROAD NEWS.

Chicago Great Western.—A circular has been sent to stockholders in regard to the contracts recently made with the packing companies doing business at Kansas City, St. Joseph, Omaha and Sioux City. For further account, see our issue of Aug. 15, page 633.

Columbus, Sandusky & Hocking.—Sale of this property has been ordered to take place at Columbus on Sept. 24 by Judge Thompson, of the United States Court. The upset price is $2,700,000. (May 2, p. 336.)

Pittsburgh & Lake Erie.—Exceptions were filed by this company in the county court on Aug. 14 against the bonds of the Pittsburgh, Carnegie & Western (Wabash) to cover damages resulting from the entrance of the Wabash into Pittsburgh to the South Side. The plaintiff alleges that the Wabash made no effort to agree upon any value of property to be taken, that it does not appear that the company is vested by law with the right to condemn the property, and that the bonds should not be less than $500,000.

Reading Company.—A new freight route between New York and Pittsburgh is to be established Sept. 1, according to the *Commercial and Financial Chronicle*, over the Central R. R. of New Jersey, between Jersey City and Tamaqua, Pa., thence over the Philadelphia & Reading to Newberry Junction, over the Beach Creek (New York Central & Hudson River) to Clearfield, and thence over the Buffalo, Rochester & Pittsburgh to Pittsburgh.

St. Louis & San Francisco.—A mortgage for $1,543,526.50 was filed on Aug. 7, with Robert Winthrop & Co., of New York, as trustee. The mortgage covers the purchase of 475 box cars, 500 gondolas, 100 hoppers, 50 flat cars, 49 Rodger ballast cars and 41 other miscellaneous cars and 38 engines of various types. The mortgage bears interest at 4 per cent., with $305,520.50 payable when the stock is delivered, and the remainder in semi-annual payments.

Seaboard Air Line.—Holders of collateral trust 5 per cent. gold bonds due Oct. 1, 1902, are notified that on delivery of same at the offices of Vermilye & Co., and of Hallgarten & Co., and upon payment of $25 per bond, they will have the privilege of exchanging them for an equal amount, par value, of Seaboard refunding collateral trust 5 per cent. gold bonds, due May 1, 1911. A large proportion of the bonds having already been exchanged, the offer is subject to withdrawal at any time without notice.

Southern Pacific.—The executive committee at a meeting Aug. 14 adopted a resolution recommending an issue of $100,000,000 4 per cent. bonds, convertible into stock at par at any time within 25 years of the date of the issue, and subject to call on certain conditions at 105. It is said that as soon as the details are completed and the issue is approved, shareholders will have an opportunity to subscribe to a portion of the new bonds at a low figure. The bonds are to be issued for improvements of road and equipment.

Sylvania.—This railroad, extending from Rocky Ford, Ga., to Sylvania, 16 miles, has been sold to Mills B. Lane, President of the First National Bank of Savannah, for $10,000. The road has been in the hands of a receiver for over a year.

Velasco, Brazos & Northern.—This property, including a road 22 miles long between Velasco and Anchor, Texas, was transferred on Aug. 7 to C. C. Waller and E. P. Speers for $240,000. Under the reorganization Mr. Waller has been elected President, and Mr. Speers, Vice-President and General Manager. Preliminary surveys for an extension north from Anchor, Texas, were made last March, and it is said that the plan of the new owners is to build to a point on the Atchison, Topeka & Santa Fe in Grimes County, Texas, 114 miles from Anchor. Under the old organization I. H. Kempner, of Galveston, was President. (March 21, p. 218.)

West Penn Railway & Lighting.—This company is to be formed as a holding company to own the stock and some of the bonds of the Pittsburgh, McKeesport & Connellsville Street R. R., several other local lines, and all of the light companies in the more important places through which they pass, except McKeesport. No capital stock and bonds have as yet been issued, but the bonds, when they appear, will be 5 per cent. gold mortgage and collateral trust bonds. It is understood that the capital of the holding company will be in the neighborhood of $6,000,000 common stock and $4,000,000 of bonds. E. C. Converse, C. M. Schwab, Jas. S. Kuhn and others, of New York, are interested.